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Table 8
SUPPLY-DEMAND BALANCE: EUROPE
[TWO YEARS' DESIRED RELATIVE INVENTORY]
(Millions of Pounds U_3O_8 Equivalent)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production	6.6	6.7	6.7	7.4	8.1	8.1	8.1	8.1	8.1	7.7
less										
Consumption	27.9	34.3	36.5	43.0	41.9	42.7	44.9	46.4	46.9	48.1
plus										
Net Imports	34.2	34.8	34.3	34.1	34.9	28.8	28.9	23.1	23.0	22.1
equals										
Supply Surplus/(Deficit)	12.9	7.2	4.5	(1.5)	1.1	(5.8)	(7.9)	(15.2)	(15.8)	(18.3)
plus										
Beginning Inventory	108.7[1]	121.6	128.8	133.3	131.8	132.9	127.1	119.2	104.0	95.0
equals										
Nominal Inventory	121.6	128.8	133.3	131.8	132.9	127.1	119.2	104.0	88.2	76.7
less										
Minimum Inventory	62.2	70.8	79.5	84.9	84.6	87.6	91.3	93.3	95.0	99.6
equals										
Excess Inventory/	59.4	58.0	53.8	46.9	48.3	39.5	27.9	10.7		
(Unfilled Demand)									(6.8)	(22.9)
Adjusted Ending Inventory	121.6	128.8	133.3	131.8	132.9	127.1	119.2	104.0	95.0	99.6
Relative Inventory (years)	3.5	3.4	3.3	3.1	3.1	2.9	2.6	2.2	2.0	2.0

[1] Nuexco estimate — commercial inventory only

Table 9
URANIUM SUPPLY-DEMAND BALANCE: WOCA[1]
(Millions of Pounds U_3O_8 Equivalent)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
PRODUCTION[2]										
Operating production centers	102.5	87.2	85.1	85.8	86.6	85.5	84.6	84.8	84.4	88.6
Facilities under construction	0.7	3.2	8.9	9.6	13.3	13.3	14.2	13.8	13.8	13.1
Planned facilities	0	0	0	0	0.5	1.0	1.0	1.0	2.0	4.0
Total	103.2	90.4	94.0	95.4	100.4	99.8	99.8	99.6	100.2	105.7
less										
CONSUMPTION[3]	63.4	73.9	82.9	90.7	94.4	100.4	106.9	105.1	106.3	109.9
equals										
NET INVENTORY INCREASE/(DECREASE)	39.8	16.5	11.1	4.7	6.0	(0.6)	(7.1)	(5.5)	(6.1)	(4.2)
plus										
BEGINNING INVENTORY	397.9[4]	437.7	454.2	465.3	470.0	476.0	475.4	468.3	462.8	456.7
equals										
ENDING INVENTORY	437.7	454.2	465.3	470.0	476.0	475.4	468.3	462.8	456.7	452.5
RELATIVE INVENTORY (years)[5]	4.9	5.0	4.8	4.7	4.6	4.5	4.4	4.3	4.1	4.0

[1] Excludes Communist areas

[2] Nuexco Report 172, Table 5

[3] Report 173, Table 9

[4] Nuexco estimate — commercial inventory only

[5] For each year, Relative Inventory equals the number of years of forward consumption which could be supplied by that year's Beginning Inventory.

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Table 10

NUEXCO ESTIMATE OF UNCOMMITTED PRODUCTION

(Millions of Pounds U_3O_8)

Year	Southern Africa	Other WOCA	Total
1984	2	8	10
1985	5	11	16
1986	8	18	26
1987	9	21	30
1988	10	22	32
1989	11	25	36
1990	11	26	37
1991	12	31	43

Table 11

NUEXCO ESTIMATE OF UNCOMMITTED PRODUCTION AND UNFILLED REQUIREMENTS

(Millions of Pounds U_3O_8)

	Uncommitted Production		Unfilled Requirements	
	WOCA	Southern Africa	WOCA	Non-US
1984	10	2	12	3
1985	16	5	13	4
1986	26	8	23	3
1987	30	9	22	4
1988	32	10	29	8
1989	36	11	32	9
1990	37	11	37	12
1991	43	12	37	15

Table 12

NUEXCO EXCHANGE VALUE COMPARED TO SUPPLY-DEMAND RATIO IN 1982

Month	Supply-Demand Ratio	Exchange Value
	(as of the last day of the month)	
January	3.5	$23.00
February	3.3	23.00
March	5.2	22.50
April	9.3	20.75
May	9.5	20.50
June	16.2	19.25
July	2.6	18.25
August	10.6	17.00
September	5.0	17.00
October	2.1	17.50
November	1.0	19.75
December	2.3	20.25

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REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
P.O. Box 70
7 Cliff Street
Milson's Point
NSW 2061, Australia
Telephone: (61-2) 929-6999
Telex: 73303 (ORATOM AA)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: 431-6031, 431-6025
Telex: 242-5069 (JATECH J)

SOUTH AFRICA

Chris I. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 8-9878

TAIWAN

Edward Bee
Bee & Liang Company, Limited*
8-G Fl. Jen AE Mansion
NOK 37 Jen AI Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: (886-2) 721-2117
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, North Carolina 28327
Telephone: (919) 949-3622

Joe L. Hixon*
302 Lombardy
Sugarland, Texas 77478
Telephone: (713) 494-3802

W. Hardy Prentice*
11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: (216) 631-2350

SPECIAL CONSULTANTS

Sanford C. Anderson
Palo Alto, California

Raymond C. Freeman
Santa Barbara, California

Claus Thiesen
Kirkland, Washington

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

---

*Independent contractors representing Nuexco

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NUEXCO

JUNE 1983 NUMBER 178

Monthly Report on the Nuclear Fuel Market

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)
TWX: 910-373-1760 (NUEXCO MNPK)

J. Robert Wolcott
Chairman

George White, Jr.
President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Thomas A. Boyden, V.P.

Wayne D. Fowler, V.P.

R. Wesley Miller, V.P.

Christian C. Guitton

Kim M. Peyton

Donald W. Radcliffe

Judith L. Sellers

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan, V.P.

Kathryn K. Bowen

W. Scott Hickman

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Kenneth R. McCue, V.P.

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 500
Seven Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210

M. Jerry Reaves, V.P.

(See inside back cover for list of Representatives and Consultants)

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NUEXCO REPORT 178
FIGURES OF THE MONTH
(May 31, 1983)

	This Month (Report 178)	Last Month (Report 177)	12 Months Ago (Report 166)
Exchange Value[1]	23.50	23.25	20.75
Transaction Value[1]	22.35	21.40	22.60
Conversion Value[2]	1.20	1.20	1.20
Loan Use Charge Rate[3]	6%	6%	6%
Near-Term Uranium Supply[4]	5.9	8.6	13.0
Near-Term Uranium Demand[5]	3.1	2.6	1.4
Near-Term Supply-Demand Ratio	1.9	3.4	9.3
Current Transactions[6]:			
Number of Transactions	8	6	3
Quantity of Material[7]	0.4-1.2	7.6-12.8*	0.7-1.4
SWU Prices[8]:			
Nuexco SWU Values:			
FY 83	none	103	—
FY 84	103	109	—
USDOE SWU Prices:			
AFC	138.65	138.65	130.75
Requirements	149.85	149.85	138.37
Market Value of Enriched UF_6[9, 10]:			
2.5 w/o U_{235}	619.44	616.52	—
3.0 w/o U_{235}	792.80	789.24	—
3.5 w/o U_{235}	969.24	965.04	—
4.0 w/o U_{235}	1,147.96	1,143.13	—

---

[1] US $ per pound U_3O_8 equivalent
[2] US $ per pound U as UF_6
[3] Per annum
[4] Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds U_3O_8)
[5] Active inquiries to purchase, for delivery within 12 months after contract signing (millions of pounds U_3O_8)
[6] Uranium sales only; does not include loans, conversion, or SWU transactions
[7] Millions of pounds U_3O_8, equivalent
[8] US $ per SWU
[9] Calculated using the Nuexco Exchange Value, Conversion Value, and 0.20 percent tails assay. Calculations before 2/28/83 used the USDOE price for AFC SWUs. As of 2/28/83, calculations use the Nuexco SWU Value for the relevant fiscal year (currently FY 84).
[10] US $ per KgU as UF_6
*Correction of last month's arithmetic error.

INDEX TO LAST MONTH'S REPORT (176)

Topic		Page
Australia	Implications of Labor Party's federal election victory	13
Canada	Federal government insistence on upgrading to UF_6 all uranium exports	13
South Africa	First quarter production results	14
Speeches	By Jim Vaughan, to Southern African Metals and Minerals Conference	Enclosure
	By Peter Stork, to Annual Petroleum & Mineral Review Conference	enclosure
United States	Supreme Court upheld states' right to bank further nuclear development for economic (not safety) reasons	15
Uranium Marketing and Prices	*Enriched Uranium and SWUs:* Secondary market pricing in April 1983	2
	Natural Uranium and Conversion: Pricing in April 1983	1

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EXECUTIVE SUMMARY
REPORT 178

Exchange Value Rose $0.25, to $23.50	The **Exchange Value** as of May 31, 1983 is **$23.50** per pound U_3O_8. Seven spot or near-term uranium sales are reported, involving approximately 600 thousand pounds U_3O_8, *equivalent.*
Supply Demand Ratio Declined to 1.9:1	**Active** spot and near-term **uranium supply** amounts to **5.9** million pounds U_3O_8, *equivalent*, down 30% from last month. **Active** spot and near-term **uranium demand** rose 20%, to **3.1 million** pounds U_3O_8 equivalent. Therefore, the spot and near-term **supply-demand ratio** declined 30 percent, to**1.9:1.**
Transaction Value Rose $0.95, to $22.35	The **Transaction Value** as of May 31, 1983, is **$22.35** per pound U_3O_8. It includes 16 transactions involving a total of 2.1 million pounds U_3O_8, equivalent and covers a period of four months.
Conversion Value unchanged at $1.20	The **Conversion Value** as of May 31, 1983 is **$1.20** per pound U as UF_6, unchanged since last month. No secondary market conversion transactions are reported. Active sellers are offering 7.0 million pounds U in conversion services for delivery in the next three years. Active secondary market demand for conversion services, for delivery in the next three years, amounts to 1.8 million pounds U. Active supply remains approximately four times active demand.
Loan Use Charge Rate Steady at 6%	The **Loan Use Charge Rate** as of May 31, 1983 is **6 percent** per annum. No loan transactions are reported.
SWU Values: FY 83 Discontinued	Nuexco has discontinued the SWU Value for FY 83 due to the lack of activity in the secondary market for FY83 SWU deliveries.
FY 84 $103, down $6	As of May 31, 1983 the **SWU Value for FY 84** is **$103 per SWU**, down $6 from last month. This segment of the market is the most active at present. The market for FY 85 and beyond remains quiet. However, some buyers will probably be entering the market for FY85 SWUs in the near future.
Australia	Labor Party struggles with conflicts between Left Wing ideology and the realities of international politics.
Belgium	Government acquired 50% interest in Synatom.
Canada	Background and analysis of recently stiffened federal government insistence on "upgrading" to UF_6 all Canadian uranium exports.
France	Controversial government report recommends cutbacks in national nuclear program.
Germany, Federal Republic	Nuclear environment has improved during past year.
Spain	Proposed cancellation of five reactors threatens national nuclear power plans.
United States	1. Duke Power Co. officially cancelled Cherokee Unit 1, its sixth such cancellation in the past 14 months. 2. Consumers Power Co. delayed its two Midland nuclear units by 13 to 14 months each. 3. Lack of approved evacuation plans could lead to several reactor shutdowns as the issue takes on increasing importance. 4. Energy Information Administration (EIA) moving rapidly to prepare annual report on "viability of domestic uranium mining and milling industry."

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NUEXCO

MONTHLY REPORT ON THE URANIUM MARKET

June 1983
No.178

R. WESLEY MILLER, *EDITOR*

PRICING

Natural Uranium and Conversion 1
Enriched Uranium and SWUs 1

CURRENT MARKET DATA

Exchange Value and Transaction Value 3
Conversion Value and Loan Use Charge Rate 4
SWU Value 5
Prices Expressed in Selected Currencies 6
Transaction Summary 8
Supply and Demand Tables 9

RECENT DEVELOPMENTS

Australia 13
Canada 14
Europe 14
South Africa 16
United States 17

ANALYSIS AND COMMENTARY

Update On US Import Limitation Efforts 18

HISTORICAL MARKET DATA

Graph of Exchange Value and Transaction Value 20
Historical Exchange Value, Transaction Value and Conversion Value 21

GOVERNMENT STATISTICS

Australia 22
Canada 23
South Africa 24
United States 25

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FOREWORD

We are pleased to announce that Mr. **Earl E. Hoellen, Jr.** will be joining Nuexco's Northeast United States office as a Regional Marketing Manager. Earl will assist Ken McCue in our uranium brokerage operations.

Earl comes to Nuexco from Westinghouse Electric Corporation, where he was involved in the marketing of steam generator services. Earl was previously employed at Duke Power Company, where he was Assistant Manager of Nuclear Fuel Purchases for the past 4 years. Prior to that, Earl was Vice President and Project Manager at Western Fuel, Inc. He holds a B.S. in nuclear engineering from the University of Virginia, and an M.B.A. from the University of North Carolina.

* * *

Mr. **J. Robert Wolcott** addressed the General Electric 1983 Fuel Conference in Hilton Head, South Carolina on May 9. A copy of his speech is enclosed with this Report.

NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of May 31, 1983 rose for the eighth consecutive month, to **$23.50** per pound U_3O_8, up $0.25 since last month. The *Current Market Data* section of this Report lists eight uranium sales transactions, none of which involved more than 300 thousand pounds U_3O_8, *equivalent*. The total was 0.4 to 1.2 million pounds U_3O_8; the seven spot or near-term transactions accounted for approximately 600 thousand pounds U_3O_8.

Active spot and near-term uranium supply (U_3O_8 or natural UF_6 offered at competitive prices, terms, and other conditions) amounts to **5.9 million** pounds U_3O_8 equivalent, down 30 percent from last month's level of 8.6 million. **Active spot and near-term uranium demand** rose 20 percent, to **3.1 million** pounds U_3O_8, equivalent. Therefore, the spot and near-term **supply-demand ratio** declined to **1.9:1**, 44 percent lower than last month's level of 2.6.

* * *

The **Transaction Value** as of May 31, 1983, is **$22.35** per pound U_3O_8, equivalent, an increase of $0.95 since last month. The current Transaction Value includes 16 transactions involving a total of 2.1 million pounds equivalent, and covers a period of four months.

* * *

The **Conversion Value** as of May 31, 1983 is **$1.20** per pound U as UF_6, unchanged from last month. No secondary market conversion transactions are reported this month. In reporting *active* supply and demand for secondary market conversion services, Nuexco has replaced the former interval of "within one year" (spot and near-term) with a three-year interval, in order to more accurately reflect the way participants in this market are behaving.

Active supply of secondary market conversion services (active inquiries to sell secondary market conversion services for delivery within the next *three* years) totals **7.0 million** pounds U. Similarly, **active demand** for secondary market conversion services amounts to **1.8 million** pounds U.

The ratio of secondary market conversion supply and demand is **3.9:1**. That key ratio is essentially the same as last month's corresponding ratio, derived using the one-year interval.

* * *

The **Loan Use Charge Rate** remained at six percent per annum. Nuexco is aware of at least three lenders holding a total of more than three million pounds available for loan as U_3O_8 at 6 percent per annum, but there are few potential borrowers. No loan transactions are reported this month.

* * *

The **Exchange Value's** eighth consecutive monthly increase is attributable more to a continuation of the trend of recent months than to substantial upward price pressure. The prices of the relatively small amounts traded—seven spot or near-term transactions averaging less than 100 thousand pounds U_3O_8, equivalent—justified the $0.25 increase in the Exchange Value, but one or two large transactions could have had a substantially larger impact in either direction. Although the preponderance of bids, offers and transactions lie within the range from $22.50 to $24.50, potential buyers for substantial quantities are exercising a high degree of discretion, and most sellers holding large lots are holding firmly to their offering prices. The result is a market poised for a renewed surge of activity. Whether that will lead to rising, dropping or stable prices remains to be seen.

ENRICHED URANIUM AND SWUS

As of May 31, 1983 Nuexco has discontinued the **SWU Value for FY 1983**, due to the virtual absence of activity in the secondary market for SWU deliveries. In fact, there have been no recent secondary market SWU sales for FY 1983 delivery.

DOE, because of heavy commitments at the end of fiscal year 1983, will not allow potential sellers to make changes to their 180 day enrichment order of quantities and tails assays to be delivered. Buyers seeking DOE SWU for FY 1983 delivery must find a seller who has already ordered the desired enrichment assay, or who has such an assay in inventory. Likewise, sellers of Eurodif-origin SWUs cannot guarantee FY 1983 delivery of enriched material of the assay desired by a buyer, particularly if export and import of the enriched material to the buyer's country for fabrication is required.

As of May 31, 1983 the **SWU Value for FY 1984** is **$103** per SWU, down $6 since last month. The relatively large price drop, 5.5 percent in a market that is typically much less volatile than the uranium market, reflects the dominance of the market by sellers of large quantities of

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PRICING

Eurodif-origin SWUs. They continue to price aggressively in their efforts to induce holders of DOE requirements-type contracts having 3.5-year termination provisions to terminate (or partially terminate) those contracts and purchase replacement SWUs on the secondary market.

Previously, these sellers were willing to offer prices near $110 per SWU, a level which was attractive only to the large block of potential buyers who, requiring deliveries in June-August, 1984, were thus able to terminate with more than 1 year's notice. Recently, however, the strong competition among sellers for a declining number of buyers, has increased downward pressue on prices. Furthermore, DOE has given customers indications that henceforth it will use the midpoint of FY 1984 (April 1, 1984) as the assumed date of a terminated delivery for requirements contract terminators buying non-DOE SWUs. Thus, in order to attract buyers who must pay termination charges based on less than one year's notice (25 percent rather than the 20 percent associated with 1-2 years' notice), sellers of Eurodif-origin SWUs have been offering at approximately $103 per SWU for FY 1984 delivery.

The secondary SWU market for FY 1985 and later remains quiet, as it has for the past several months. Potential sellers continue to await DOE's announcement of the terms and conditions of conversion to the FR (Facility Requirements) contract. That announcement had been expected in late April or early May, but has been delayed at least until late July or early August. However, some buyers will probably be entering the market for FY85 SWUs in the near future. Sellers will probably quote to them in terms of a discount to be applied to AFC SWU prices.

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CURRENT MARKET DATA

EXCHANGE VALUE $23.50/lb. U_3O_8
Determined as of May 31, 1983

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

---

[1] In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of May 31, 1983

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
22.35	2.1	16	4

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

Comments

Nuexco does not consider the following in determining the Transaction Value:

A. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.
B. The price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of Exchange Value or any other independent variable. Also excluded from consideration are all data where the delivery price is defined in such a way that it cannot currently be determined.

---

[2] Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161. Corresponding data for 1982 are tabulated on page 5 of Report 173.

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CURRENT MARKET DATA

CONVERSION VALUE[1] $1.20/lb. U as UF_6
Determined as of May 31, 1983

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:

A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

[1] Monthly data for 1981 and 1982 are tabulated on page 6 of Report 173.

LOAN USE CHARGE RATE[2] 6%
Determined as of May 31, 1983

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:

A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[2] Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162. Monthly data for 1982 appear on page 2 of Report 173.

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SWU VALUE $103/SWU for FY84
Determined as of May 31, 1983

Definition

The SWU (Separative Work Unit) Value is Nuexco's judgment of the price, expressed in US dollars per SWU, at which transactions for the sale of significant quantities of SWU of any origin for delivery in the specified DOE fiscal year could be concluded as of the last day of the month.

Derivation

Nuexco bases the SWU Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.
E. SWU prices at varying tails assays and varying product assays are converted to the equivalent SWU price at the DOE Reference Transaction Tails Assay (presently 0.20 weight percent U_{235}) and a product assay of three percent U_{235} assuming feed costs calculated using the Nuexco Exchange Value and Nuexco Conversion Value determined as of the last day of the same month.

Comments

Nuexco does not consider the following in determining the SWU Value:

A. The price of SWU delivered under long-term contracts from primary suppliers, such as DOE, Urenco, or Eurodif.
B. The price of SWU delivered under other than arm's length transactions.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	26.60	58.65	69.17
Belgium (comm. franc)	1,181	2,603	3,070
Canada (dollar)	28.90	63.71	75.13
Finland (markka)	128.63	283.57	334.40
France (franc)	176.96	390.12	460.05
FRG (mark)	59.02	130.11	153.43
Italy (lira)	35,075	77,326	91,186
Japan (yen)	5,589	12,321	14,529
Netherlands (guilder)	66.44	146.48	172.73
South Africa (rand)	25.28	55.73	65.71
Spain (peseta)	3,264	7,196	8,485
Sweden (krona)	176.69	389.54	459.36
Switzerland (franc)	48.88	107.76	127.07
UK (pound)	14.65	32.29	38.08
US (dollar)	23.50	51.81	61.09

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	25.30	55.78	65.78
Belgium (comm. franc)	1,123	2,476	2,920
Canada (dollar)	27.48	60.59	71.45
Finland (markka)	122.33	269.69	318.04
France (franc)	168.30	371.03	437.54
FRG (mark)	56.13	123.74	145.92
Italy (lira)	33,358	73,542	86,724
Japan (yen)	5,315	11,718	13,818
Netherlands (guilder)	63.19	139.31	164.28
South Africa (rand)	24.04	53.00	62.50
Spain (peseta)	3,104	6,844	8,070
Sweden (krona)	168.05	370.48	436.88
Switzerland (franc)	46.49	102.48	120.85
UK (pound)	13.93	30.71	36.21
US (dollar)	22.35	49.27	58.11

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[1] Calculated using currency exchange rates published in the Wall Street Journal on May 31, 1983.

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CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF₆	per kg U as UF₆
Australia (dollar)	1.36	3.00
Belgium (comm. franc)	60.30	132.94
Canada (dollar)	1.48	3.25
Finland (markka)	6.57	14.48
France (franc)	9.04	19.92
FRG (mark)	3.01	6.64
Italy (lira)	1,791	3,949
Japan (yen)	285.37	629.14
Netherlands (guilder)	3.39	7.48
South Africa (rand)	1.29	2.85
Spain (peseta)	166.67	367.44
Sweden (krona)	9.02	19.89
Switzerland (franc)	2.50	5.50
UK (pound)	0.75	1.65
US (dollar)	1.20	2.65

SWU VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	FY 1984 per SWU
Australia (dollar)	116.61
Belgium (comm. franc)	5,176
Canada (dollar)	126.66
Finland (markka)	563.77
France (franc)	775.60
FRG (mark)	258.66
Italy (lira)	53,731
Japan (yen)	24,495
Netherlands (guilder)	291.21
South Africa (rand)	110.79
Spain (peseta)	14,306
Sweden (krona)	774.44
Switzerland (franc)	214.23
UK (pound)	64.19
US (dollar)	103.00

[1] Calculated using currency exchange rates published in the Wall Street Journal on May 31, 1983.

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CURRENT MARKET DATA

TRANSACTION SUMMARY[1]

Uranium Transactions

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
2306	1983	101-300	indeterminate	European Entity	European Utility	Barter for UF_6
2320	1983	50-100	indeterminate	US Producer	European Utility	
2327	1983	101-300	97	US Utility	Unknown	UF_6
2335	1983	Less than 50	100	European Utility	US Producer	
2349	1983	50-100	99	European Entity	US Producer	UF_6
2349	1985	101-300	99	European Entity	US Producer	
2353	1983	Less than 50	100	European Utility	US Producer	
2354	1983	Less than 50	104	European Utility	US Producer	

Conversion Transactions

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller	Buyer	Remarks

There are no conversion transactions reported this month.

Loan Transactions

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current L.U.C.R.	Lender	Borrower	Remarks

There are no loan transactions reported this month.

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[1] Transactions listed are not limited to those in which Nuexco was involved but also include others of which Nuexco is aware.

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URANIUM SUPPLY
(As of 5/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
	Spot or Near-term[2]	Intermediate or Long-term[3]	
Available for Sale:			
ACTIVE			
1575		500 per year	Long Term
1818		250 per year	Long Term
2017		2,300	
2038	2,000		UF_6
2056	1,800		UF_6
2134		300 per year	1984 on
2162	130		Primarily UF_6
2191	125		UF_6
2193		800 per year	1986-90
2201	30		
2203	1,200		
2219	200		Enriched UF_6
2235		100 per year	1985-87
2245	200	100 per year	1984-88
2271		500 per year	1984-88
2275	80		
2294	125		U_3O_8 and UF_6
TOTAL:	5,890		
INACTIVE			
1877	115		
2246	40	100	
TOTAL:	155		

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[1] Measured from the date of this Report

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CURRENT MARKET DATA

URANIUM DEMAND
(As of 5/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
	Spot or Near-term[2]	Intermediate or Long-term[3]	
Inquiries to Purchase:			
ACTIVE			
1871		250 per year	1984-86
1996	400		
2010		400 per year	1984-92
2042	600	1,400	1986-90
2061	15		
2115		200 per year	1985 on
2167	250	250 + per year	1984-99
2187	50		
2188		300 per year	1985 on
2206	200		Enriched UF_6
2214	400		UF_6
2217	900	500 per year	1984-95
2244		350 per year	1985 on
2252	325		UF_6
TOTAL:	3,140		
INACTIVE			
1459		200 per year	Long Term
1888		400 per year	Long Term
1999		50 per year	1985-90
2025		350	
2269	250		
2270	175		
TOTAL:	425		

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[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CONVERSION SUPPLY
(As of 5/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	Within 3 Years	Beyond 3 Years	
ACTIVE			
1609	1,500		
1840	130		
1936	1,500	200 per year	Long Term
2051	1,500		
2141	1,500		
2143	400		
2220	400		
2222	100	175	
TOTAL:	7,030		
INACTIVE			
2008	800	800	
2181	650	650 per year	Long Term
TOTAL:	1,450		

CONVERSION DEMAND
(As of 5/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	Within 3 Years	Beyond 3 Years	
ACTIVE			
2129	900		
2135	400	135 per year	1986-87
2199	450	300 per year	1986 on
TOTAL:	1,750		
INACTIVE			
2190	400	200 per year	1986 on
2194		300 per year	1986 on
2295	250		
TOTAL:	650		

[1] Measured from the date of this Report.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(As of 5/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1938	1,500		UF_6
2121	600		
2128	2,500		
2205	300		
TOTAL:	4,900		
INACTIVE			
1815	1,000		UF_6
1884	600		
2036	500		UF_6
2040	600		UF_6
2139	2,000		
TOTAL:	4,700		
Inquiries to Borrow:			
ACTIVE			
1998	200	200	
2006	600		
2118	250		U_3O_8 or UF_6
TOTAL:	1,050		
INACTIVE	None		

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[1] Measured from the date of this Report

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AUSTRALIA

Australia's governmental policies on uranium marketing and nuclear safeguards are characterized by confusion arising from the conflict between Left Wing ideology on the one hand and practical politics on the other. For example, the government has granted Energy Resources of Australia (ERA) and Queensland Mines, Ltd. (QML) new licenses to negotiate uranium supply contracts. In theory, these new licenses have freed both companies to respond to current market opportunities. However, the granting of licenses to negotiate new contracts might be construed to conflict with the ALP (Australian Labor Party) platform provisions calling on an ALP government to phase out the industry (*presumably* meaning to support the fulfillment of existing contracts while prohibiting new developments).

While the government grapples with one of its thorniest political problems, the uranium companies find themselves in a tenuous marketing position. Until prospective buyers receive reasonable assurances that new contracts will be honored by the ALP government, ERA and QML will find it difficult to represent themselves as reliable suppliers under new contracts. On the other hand, if they wait for the ALP to resolve its stance on the issue, they may miss some opportunities for sales.

The conflict between Left Wing ideology and practical politics was also behind the seemingly contradictory behavior of Australia's Foreign Minister, Mr. Hayden, while in Paris to attend the IAEA meeting. On the one hand, Mr. Hayden expressed Australian support for the development of standard, international safeguards for the use, storage, and monitoring of uranium for peaceful purposes. At the same time, the former ALP leader strongly protested against French nuclear weapons testing at the Mururoa Atoll in the Pacific Ocean. In his protest he reiterated the ALP platform stance by proposing an Australian ban on uranium sales to France unless the tests were discontinued.

Respondents to Hayden's protest, however, made it clear that such a ban would not only be seen in Europe as an action against France, but that sales of other Australian commodities in the European market such as coal and agricultural products would in turn be affected. Consequently, following the IAEA meeting Mr. Hayden endorsed a communique stressing the importance of stable trade in nuclear equipment, fuel cycle services and nuclear fuel. The European reaction is a factor the ALP will not be able to ignore in the development of a practicable uranium policy.

Having heeded the Europeans' warnings that an uncompromising position would seriously endanger Australian trade in general, the government has undertaken to review its policy through several committees. In practical terms, the outcome will indicate to what degree the party platform can be modified in order for the government to maintain Australia's international reputation as a reliable supplier of resources. In the meantime, Mr. Hawke has let it be known that he will treat French military testing of nuclear weapons and Australian uranium exports to France as two separate issues during his upcoming meetings in France.

* * *

There are those within the ranks of the ALP who would advocate a more active role for Australia in nuclear matters on the basis of Australia's large uranium reserves. They reason that, if Australia could become a promoter of safeguards, including the safe burial of civil nuclear wastes, and at the same time contest military uses and weapons testing, it would reduce opposition to uranium mining and export within the labor movement.

Presently, the Australian government is reviewing its bilateral safeguards agreements. Although it will take some time before the review is concluded, Australia should be prepared for bitter resistance from the EEC (European Economic Community) and Japan, should a tougher position be taken, especially as certain points of disagreement put aside for the original agreements still exist. Until the review is complete, however, Australian uranium exports under existing contracts will continue.

* * *

Western Mining Corp. (WMC) will likely scrap the Yeelirrie uranium project if no progress is made this year to launch it. Developers have spent 30 million dollars on the project since it was discovered 13 years ago by WMC and its former joint venture partners. Since Esso's withdrawal from the project in 1982, WMC has unsuccessfully sought a new partner. French interests were explored, but the advent of new Australian political leadership foreclosed the possibility of a French uranium partnership, at least for the immediate future.

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RECENT DEVELOPMENTS

CANADA

In last month's Report [#177, pg. 13], mention was made of the Canadian government's apparent decision to informally strengthen the implementation of its so-called "upgrading" policy requiring the export of natural uranium in the form of UF_6 whenever possible. This policy decision is undoubtedly based on the desire to utilize the full capacity of Eldorado's new Port Hope conversion facility. Furthermore, its timing reflects the confidence associated with the considerable success Canadian uranium sellers have enjoyed during the past few years.

The observed reaction of utilities, particularly those in the USA, has been one of resisting the purchase of UF_6 if conversion services have been contracted previously. This resistance has been evident even when an economic case can be made for the purchase of UF_6; i.e. when the sum of existing conversion costs plus the cost of U_3O_8 is greater than the sum of UF_6 purchase cost plus any costs associated with the cancellation or renegotiation of existing conversion commitments.

The success of the Canadian government's action depends on the belief that economics will prevail. The secondary SWU market, the development of which has been totally based on economics; provides an example in support of that belief.

To date, US utilities have not exhibited such economically rational behavior regarding the purchase of UF_6. On the contrary, it is clear that a number of Canadian sales during the past few years would not have been concluded had an inflexible upgrading policy been in place. Furthermore, there are recent cases where insistence on upgrading has, in fact, resulted in lost sales. While this situation could reverse and parallel the SWU market, there are several reasons why such a reversal seems unlikely.

First, the relationship between utility and converter is quite different than that which exists between utility and DOE. The former relationship is typically characterized by long-term personal associations and experience in working out commercial problems. The competitive conversion market has demanded flexibility. In contract, DOE's relationship to its utility customers has been that of a government monopoly, as indicated by DOE's decisions to alter its enrichment contracts by fiat as opposed to negotiation.

Secondly, in the secondary SWU market the economic advantage is immediately quantifiable. Such is not the case in the UF_6 vs. U_3O_8 plus conversion decision. Even if UF_6 looks cheap today, there is concern about what might happen to prices in the future, particularly should the Canadian government elect to re-involve itself in pricing matters.

Accordingly, it seems unlikely that the market will witness any significant cancellation of existing conversion agreements in order to purchase UF_6. The available market, then, is reduced to those utilities having uncovered conversion needs. In the USA, due to the number of reactor cancellations and delays which have already necessitated stretchouts and renegotiations of conversion commitments, there are few utilities with such needs. Thus, an inflexible upgrading policy is likely to result in a slowdown in the penetration of the US uranium market by Canadian sellers. An interesting consequence of such a development could be a reduction of the pressure within the US uranium industry for protection from imports.

EUROPE

Belgium

On April 28, 1983, the state acquired a 50 percent share in Synatom, the nuclear fuel procurement and management company serving the country's nuclear power industry in Belgium. To accomplish this, the Synatom capital shares were doubled, and the new shares were wholly subscribed by the Societé Nationale d'Investissement (SNI), a government entity.

The private shareholders of the company remain (current shareholding shown in parentheses): EBES (20 percent); Intercom (20 percent) and Unerg (10 percent). The change does not affect the existing obligations of the company. However, the presence of government representatives on the board of directors could, to a limited extent, increase the company's influence on government policy decision, and vice versa.

France

In **France**, a government commissioned report on energy policy, scheduled for review in June, is creating a lot of international interest. Portions of the report "leaked" to newspapers in Europe concluded that, although the nation does not *need* to order any more

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nuclear units for the next nine years, France should order one 1,300 MWe unit during each of the next seven years in order to sustain the French nuclear manufacturing infrastructure. The newspapers' accompanying pessimistic commentary on France's nuclear future has generated much controversy, particularly because most members of the working group charged to prepare the study have repudiated its conclusions.

The French program, which had a net capacity of 2,508 MWe in 1973, went through a dramatic growth phase in the years following the Arab oil embargo. Nuclear units comprising 4,540 MWe began operations in 1980 and 8,990 MWe began operations in 1981. The requirements of these plants alone account for over 4 million pounds of U_3O_8 per year. Formerly, optimistic projections of growth in electricity demand had produced a forecast of approximately three to five new nuclear units per year until 1990.

If the report's conclusions, as presently stated, are enacted by the government, France's installed nuclear generating capacity as of 1990 would be 6,000 MWe lower than the current forecast. Moreover, future orders from Framatome might be reduced to one 1,300 MWe unit per year. Although the report implies that such a level of orders would be sufficient to sustain France's nuclear manufacturing capability, manufacturers have already challenged that conclusion vigorously and publicly.

It would be inappropriate to discuss the impact on uranium procurement before the government completes its update of national energy policy. At that time, high-case and low-case scenarios can be constructed for the effect on uranium demand for the largest uranium consuming body in the free world, Électricité de France (EdF). Although the direction of the report's conclusions was indicated by an interim report issued some seven months ago, the furor has led the author, Mr. Noel Josephe, to offer to write a so-called "final" report, including opposing points of view. The final report might be released this summer.

Federal Republic of Germany

The nuclear environment in the **Federal Republic of Germany (FRG)** has improved over the past year. While there still exists a considerable amount of opposition to nuclear power, there are tangible signs that the FRG program as a whole is moving forward. The Brokdorf nuclear power plant, once feared to be headed for an indefinite deferral, is now under construction. The plant, owned jointly by Nordwestdeutsche Kraftwerke (NWK) and Hamburgische Electricitaetswerke (HEW), is tentatively scheduled for a 1986 or 1987 completion date. Similarly, the reprocessing plant at Dragahn has received approval to commence construction. Dragahn is located near Gorleben, which only a few years ago was rejected as a site for a reprocessing facility, primarily on political grounds. In addition, the controversial fast breeder (SNR-300) and high temperature (THTR-300) prototype reactors have received the requisite funding from the FRG government — financial support which had previously been withheld.

Chancellor Helmut Kohl has stated publicly his strong support for nuclear power, and the coalition government of the Christian Democrats (CDU) and the Free Democrats (FDP) can be expected to reflect this position in its actions. It is interesting to note however, that during the recent elections, the Greens, a party known for its anti-nuclear stance, received only 5.1 percent of the vote in regions where nuclear facilities were located, as opposed to a national average of 5.6 percent. It appears then, that nuclear power might be declining in importance as a political issue.

Although the outlook for nuclear power in the FRG seems more positive than it has in the recent past, nuclear utilities still face certain problems. As in the USA, FRG utilities have experienced significantly lower load growth rates than had been expected. At a time when capital for new construction is scarce, critics of nuclear power are raising the question of whether new plants are actually needed at all. This argument is further supported by the fact that strong government support for the domestic coal industry effectively prohibits utilities from replacing coal-fired plants with new, cheaper nuclear plants in their base load. Certain utilities that are now paying upwards of US dollars 50.00 to 100.00 per metric ton of domestic coal would find it economical to replace their coal-fired units with nuclear generating units, but are frustrated by both governments' backing of the coal industry and critics' insistence that they justify the need for additional generating capacity.

From a commercial standpoint, the improved climate for nuclear power should mean that the sharp build-up of utility inventories will ease, and begin to reverse itself over the next few years. This may be quite important in terms of the potential impact on the spot market for uranium. If the FRG nuclear units were to continue being delayed or cancelled, it is possible that utility spot sales might begin to increase as the ratio of inventory to anticipated future demand would prompt some utilities to liquidate their inventories in order to reduce their carrying costs. The potential impact of such an event may be measured by examining the role that spot sales by US utilities played in the price decline of 1980-1982. It now seems unlikely that FRG utilities will be forced to take similar actions. Unfortunately, however, FRG uranium stocks are sufficiently high that there is little unfilled uranium demand in the 1980s, even if one uses optimistic assumptions regarding plants under construction and planned. While advocates of nuclear power may take pleasure in the current political situation in the FRG, uranium suppliers will have to wait for some time to enjoy the full benefits.

Spain

The major role nuclear power was to play in **Spain**'s energy future has been threatened by the proposed cancellation of 5 Spanish reactors. The units in question, Valdecaballeros Units 1 and 2, Trillo Units 1 and 2, and Vandellos Unit 2, represent 4,926 MWe and could account for 42 percent of Spain's nuclear energy capacity by 1990.

This proposed change in energy policy, recently announced by Carmen Mestre, Spain's Energy Director, could dramatically alter the projected future for nuclear power in that country. If such a cancellation were to take place, Spain's uranium requirements would be sverely reduced, effective almost immeidately. As Trillo Unit 1, Valdecaballeros Unit 1 and Vandellos Unit 2 had been scheduled for 1986 start-up, with initial core requirements occurring in 1984, Spain's 1984 uranium requirements would drop by 56 percent. These proposed cancellations would reduce 1985 requirements demand by 20 percent, with a cumulative reduction of 30 to 47 percent to be expected through 1990.

If the proposed cancellations are enacted, ENUSA (Empresa Nacional de Uranio, SA.), the state-owned uranium supply organization, will have to readjust uranium supplies. Presently, Spanish uranium supplies come from several long-term contracts with Africa and Canada. Only 10 percent of known supplies are of domestic origin. A cancellation of the five planned units would not only reduce Spain's requirements, but would give ENUSA the opportunity to replace foreign supply contracts with domestic ones. Spain then would need only increase production at its pilot scale production facility in the Cuidad Rodrigo region (present capacity 250,000 pounds U_3O_8 per year) and develop the Molina de Aragon and Don Benito deposits in order for ENUSA to supply 90 percent of the nation's annual uranium requirements domestically by 1988. By 1990, Spain could reach an annual 2.5 million pounds U_3O_8, enough to supply 100 percent of the reduced requirements domestically.

Currently, some of Spain's foreign supply contracts are scheduled to end in the mid-1980s. These deliveries could be terminated early and would have little further effect on the Spanish supply program. At a time when the new Spanish government is reviewing its finances, it will be interesting to see how ENUSA absorbs or adjusts its uranium inventories over the next few years in response to the Spanish government's reactor cancellation policy.

SOUTH AFRICA

A tonnage-weighted index has been adopted by the Chamber of Mines' quarterly publication, *Analysis of Working Results*. In previous analyses of the average working costs per ton milled, comparisons of results from different times were made by means of a simple ratio, adjusted by the percentage change in the consumer price index. Such logic is misleading unless a tonnage-weighted index is used to calculate the percentage increase in working cost per ton milled. This is in order to eliminate the influence on the average of new mines entering production and changes in the rate of tons milled by certain mines.

The index is based on the "Laspyres Method" and the formula used is as follows:

$$\text{Index} = \frac{\Sigma TM_0 \times CT_1}{\Sigma TM_0 \times CT_0}$$

where: TM_0 = Tons milled in previous quarter
CT_0 = Cost per ton milled in previous quarter
CT_1 = Cost per ton milled in current quarter

Figures for each quarter of 1982 are now recorded in the *Government Statistics* section of this Report (footnoted on the South Africa page) and further data will be reported when available.

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UNITED STATES

Reactor Cancellation and Delays

Duke Power Company has cancelled the construction of Unit 1 at their Cherokee Nuclear Station. Located in Gaffney, South Carolina, this station had been initially intended for three pressurized water reactors (PWR) designed by Combustion Engineering for 1,280 MWe (net) each. With the earlier cancellation of all three units at the Perkins Nuclear Station (North Carolina) and the 1982 cancellation of Units 2 and 3 at the Cherokee Nuclear Station, Duke Power Company has now cancelled six nuclear units in the past 14 months.

At present, Duke Power operates 4 PWRs comprising a total rated output of 3,760 MWe (net). Current utility forecasts indicate their intention to bring three additional units (3,470 MWe) to commercial operation between the fourth quarter of 1983 and year-end 1987.

* * *

As a result of site reinspection and rework, Consumers Power Company announced in March that both nuclear units at the Midland Nuclear Station in Michigan would be delayed for a few months. A revised schedule presented at the utility's annual meeting indicated delays of 13 to 14 months, moving the fuel loading dates to October 1984 for Unit 2 and February 1985 for Unit 1. Once in commercial operation, the two units will increase consumers' generating capacity by 1,335 MWe (net). Further delays are likely.

* * *

Emergency Planning Regulations

The criteria listed in Nureg-0654 require the implementation of an emergency evacuation plan for the zone located within a 10-mile radius around any nuclear reactor. The evacuation zone, defined in Nureg-0654, is based on source terms established by the NRC and there is some disagreement with some utilities over the degree to which those terms are overstated. However, the NRC staff does not plan to propose regulation changes for at least a year.

Indian Point Units 2 and 3, operated by Consolidated Edison and the Power Authority of the State of New York, have become the focal points of this issue. Acting as a consultant to the NRC, the Federal Emergency Management Agency (Fema) has already condemned two evacuation drills at Indian Point and the NRC has issued a third warning. Progress is being made towards solving emergency evacuation inconsistencies in New York's Westchester and Rockland Counties, but it is unlikely that solutions will be in place by June 9 — the NRC decision date for shutdown or continued operation of the station. The utilities expect that the progress made, however little, will at least allow for the continued operation of Indian Point. A decision to shut down would creat a precedent with far-reaching effects. State and local governments would be allowed to shut down nuclear reactors simply by abstaining from emergency planning.

Long Island Lighting's Shoreham Unit is inextricably linked to this issue also. This is one unit for which emergency planning problems appear insurmountable. The specific configuration of the plant in addition to its location, an island, have made workable emergency evacuation plans practically inconceivable.

The outcome of the Indian Point issue will have far-reaching implications for utilities and local governments with plants presently under construction. Administrators who have plants that might be susceptible to similar emergency planning problems may give this issue priority early on in the planning and construction of nuclear power plants. In particular, units that will probably develop *extensive* emergency plans will be Public Service of New Hampshire's Seabrook station, Philadelphia Electric's Limerick plant, and Cincinnati Gas and Electric's Zimmer plant.

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ANALYSIS AND COMMENTARY

UPDATE ON US IMPORT LIMITATION EFFORTS

The Energy Information Administration (EIA) is rapidly moving to fulfill the Secretary of Energy's obligations to monitor and report annually to Congress and the President on the viability of the domestic uranium mining and milling industry. Those obligations arose as a result of Senator Domenici's otherwise unsuccessful efforts late last year to enact a limitation on US uranium imports [Nuexco Monthly Report #174, pg. 25].

The EIA will soon hold public hearings, probably in New Mexico and Wyoming, as a prelude to the promulgation by October 4, 1983 of rules defining the criteria by which that viability will be determined. The enabling legislation specifies certain criteria that must be addressed in detail. Many of those criteria are reminiscent of "Section 202" reviews submitted annually to the Joint Committee on Atomic Energy (JCAE) by the former Atomic Energy Commission. However, the JCAE's unique congressional role in promoting the development of nuclear power was abolished in 1977. The EIA has made a major effort to assemble the required industry and market data for the study, prompting the question of how realistic it is to establish viability criteria before the first round of reports have been reviewed by the public, the Congress and the President.

Likewise, a major EIA policy analysis tool requires the design and testing of a computer model to simulate the inter-relationships between uranium demand production and pricing. Finding useful market data, fitting it to the model, and gaining confidence in its predictability may strain the reporting time frame currently envisioned. Judging from current trends, there are five fundamental perceptions of the market that will have particular importance for the upcoming EIA hearings.

1. In general, reduced demand for US production is unrelated to the percentage of uranium imports. US production declines are the direct reflection of reactor deferrals and cancellations which have reduced earlier demand projections by almost 50 percent. Increased load growth, reduced construction time and licensing predictability are the principal factors which would most directly increase the fundamental demand for uranium.

2. Although reduced demand has been reflected in the renegotiation of existing agreements, with delivery deferrals in some cases and termination of deliveries in others, there appears to be little evidence that US commitments are being abrogated in favor of non-US replacements. Rather than terminate their supply contracts completely, utilities have either stockpiled the material not needed or sold it on the spot market. Those excesses have been and remain the primary obstacles to the development of new, long-term contracts.

3. Inventory redistribution has dominated the coverage of unfilled requirements over the past two years. The spot market price has declined in direct response to the liquidation of excesses. What must be considered is that producer demand plays a significant role in the raising of spot prices. This is due to the producers' fulfillment of long-term contracts by means of spot market purchases in place of production. Producers worldwide have been reluctant to make long-term commitments on the basis of current spot prices, although those who have been willing to do so have been successful in concluding contracts. Likewise, many utilities have deferred making long-term commitments in favor of short-term spot purchases. Therefore, Nuexco believes it unlikely that long-term demand will strongly revive before the inventory overhang is reduced to a more acceptable level.

4. Various projections of rising spot prices suggest that the market price formulas utilized in recent long-term contracts (both US and non-US) may soon approach the price levels required by many US producers. Once this level is reached, at least one vital market measure of domestic industry viability will be evident. The Australian floor price is above this level and is not generally seen to be a threat to US production. Other indicators of the industry's viability such as security of supply, contract flexibility, and producer reputation will be demonstrated through the traditional contracting process. By the time any import limitations imposed within the current framework could take effect, the recovery of the uranium market might have already taken place. In that event, any such limitations might serve primarily to restrict the options available to US utilities, rather than to alter the course of the US industry's development.

5. The nuclear fuel cycle is not widely believed to need protection for national security interests, so efforts to enact an import limitation arelikely to gain favor with the public. Reserves are well defined in the USA. Mine and mill capacity (operating and in reserve) is more than adequte to meet projected demand. The USA is now, and while under free market conditions, will continue to be less dependent on imports than other major consum-

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ers of uranium. In Nuexco's opinion, US inventories and international secondary market sources are adequate to bridge any supply disruption until existing or new facilities can be brought back into production. In addition, that perception is widespread throughout the marketplace. Currently, concerns over potential supply disruptions are mitigated by the absence of a supplier's cartel outside the USA. Finally, close trading ties already exist with Australia, Canada, and South Africa, and uranium trading is viewed as one of the many relationships the USA shares with these partners. Historically then, these countries have been viewed as allies rather than as threats to national security.

No matter what viability criteria are established by the Secretary of Energy, the President will mandate what compromise is necessary before a trade barrier will be imposed. Determinations made by the US International Trade Commission that imports may be causing serious injury, or Commerce Department findings that national security may be threatened, will be weighed against State Department opposition to the unilateral imposition of import controls by the USA.

President Reagan, as Chairman of the Ninth Economic Summit which just convened in Williamsburg, Virginia, pushed for strong anti-protectionist language against trade barriers. His leadership was accepted by the other representatives of the seven largest industrial democracies who participated. There was a strong commitment to halt imposition of new trade barriers and remove those that already exist as recovery proceeds. The President's strong opposition to the original embargo legislation that failed in the House last fall and his avowed opposition to trade barriers as elements of US international policy and leadership suggest that a ban on uranium imports into the USA is unlikely.

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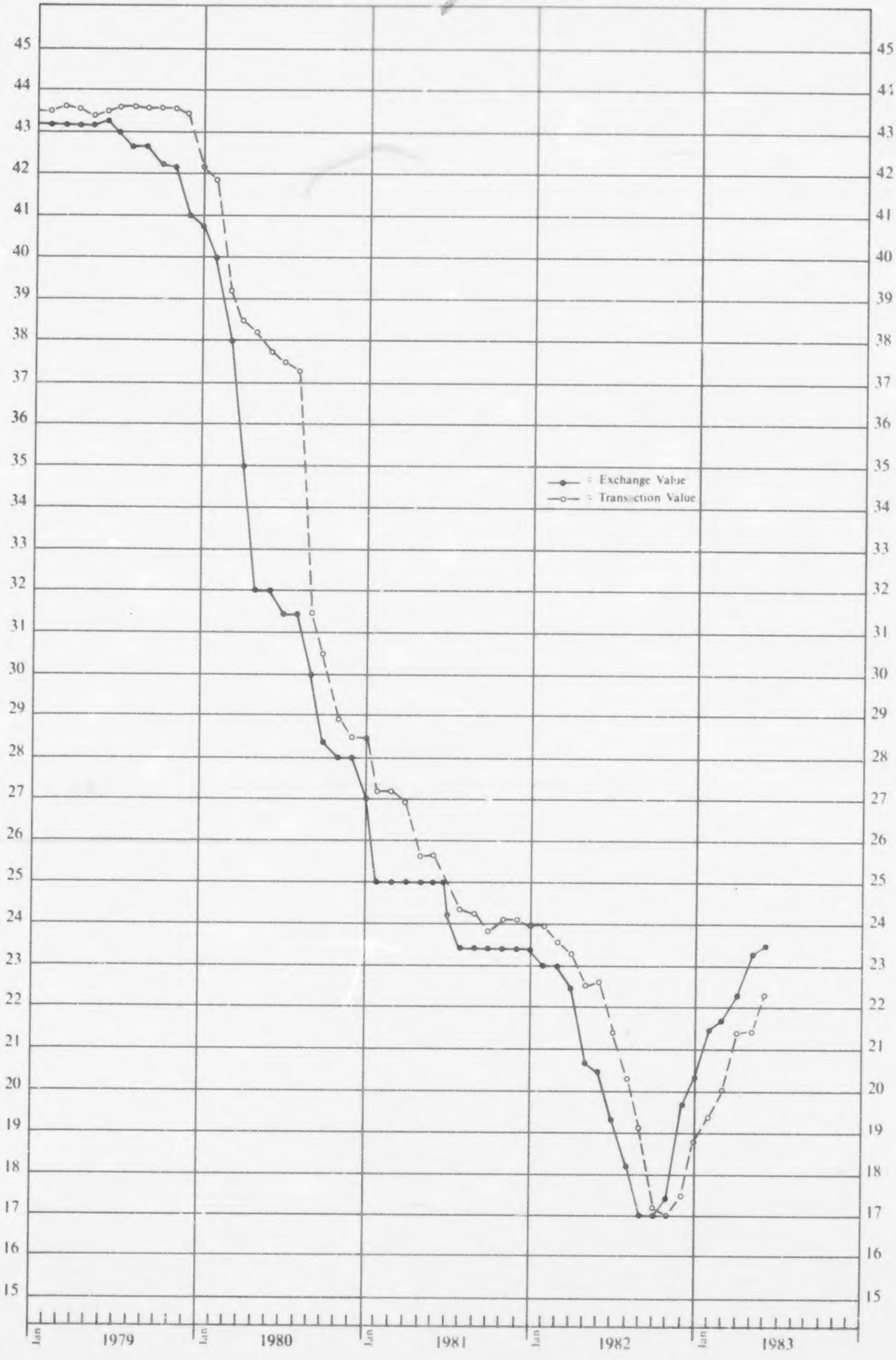
HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1979

Determined as of the last day of the month indicated



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HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	**23.50**							

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	**22.35**							

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	**1.20**							

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GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates (Year 1976 = 100.0)[2]
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.00
Annual Avg. 1981	355.3	237.34
Annual Avg. 1982	367.9	—
Dec 1981	349.9	167.6[2]
Jan 1982	354.9	169.3R[2]
Feb 1982	356.7	171.1[2]
Mar 1982	360.3	171.4R[2]
Apr 1982	367.7	171.4R[2]
May 1982	367.6	171.9R[2]
Jun 1982	367.2	173.2[2]
Jul 1982	369.1	177.2R[2]
Aug 1982	371.5	178.1R[2]
Sep 1982	374.0	178.2R[2]
Oct 1982	377.2	178.3R[2]
Nov 1982	374.5	178.4R[2]
Dec 1982	373.7	179.4R[2]
Jan 1983	386.6R	179.1R[2]
Feb 1983	387.4P	179.0[2]

P = Preliminary   R = Revised since last month

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[1] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.

[2] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0), Table 8. Figures are being converted to an Index number. As the data are converted, the new index numbers will be inserted. Figures for the latest fourteen months shown are subject to revision.

[3] Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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CANADA

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	**Wage-earner Data: Average Hourly Earnings (C$)[4] [5]**		
		Metal Mining, including Milling (SIC 050-099)[3]	**Primary Metal Industries, non-ferrous (SIC 296-298)**	**Chemicals and Chemical Products (SIC 370-379)**
Annual Avg. 1979	217.9	9.66	7.35	7.67
Annual Avg. 1980	247.2	10.80	8.05	8.50
Annual Avg. 1981	288.7	12.23	9.03	9.53
Annual Avg. 1982	288.8P	13.92	—	10.63
Feb 1982	283.5	13.61	9.60	10.19
Mar 1982	284.8	13.74	9.62	10.35
Apr 1982	287.7	13.81	9.79	10.48
May 1982	288.8	13.86	9.88	10.62
Jun 1982	289.7	13.83	9.92	10.69
Jul 1982	290.3	14.02	10.05	10.73
Aug 1982	290.3	14.23	10.03	10.80
Sep 1982	292.4	14.01	10.18	10.73
Oct 1982	292.1	13.89R	10.18	10.86
Nov 1982	291.3	14.28R	10.43	10.90
Dec 1982	292.3	14.32R	10.55R	11.06R
Jan 1983	292.6	14.47R	10.72R	11.06R
Feb 1983	293.4	14.12P	10.58P	11.02P
Mar 1983	295.2R	—	—	—
Apr 1983	296.0	—	—	—

P = Preliminary   R = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2] Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3] The wage earner series in Nuexco reports prior to March 1983 was Metals (SIC 050-059).

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[5] Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

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GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Producer[5] Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[7]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[7]
Annual Avg. 1971[3]	7.88	106.4[4]	59.1	652,294	415,956
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3] [6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3] [6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3] [6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Annual Avg. 1981	41.89	206.5	218.3	728,506	2,820,505
Nov 1981	—	214.8	229.4	720,255	253,044
Dec 1981	44.52	216.3	230.4	709,612	257,655
Jan 1982	—	217.6	233.1	700,375	257,173
Feb 1982	—	220.2	236.8	705,992	250,191
Mar 1982	45.49	225.2	237.4	725,700	262,210
Apr 1982	—	228.9	241.9	707,502	252,562
May 1982	—	230.3	244.8	715,162	258,770
Jun 1982	45.77	232.1	246.7	707,552	261,361
Jul 1982	—	234.1	249.4	702,141	283,248
Aug 1982	—	236.8	253.4	705,562	276,730
Sep 1982	48.04	241.0	255.0	704,344	282,782
Oct 1982	—	243.9	260.1	701,316	285,328
Nov 1982	—	245.4	262.5	707,966	287,699
Dec 1982	49.62	246.2	263.0	683,982	288,019
Jan 1983	—	249.0	264.9	—	—
Feb 1983	—	253.1	267.4	—	—
Mar 1983	50.35	255.9	269.1	—	—
Apr 1983	—	257.8	—	—	—

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[1] Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly. The tonnage-weight index of average working costs per metric ton of gold ore milled for 1982 is as follows. See text on page 16 for the description and calculation.

1982:		
1982:	January-March	100.0
	April-June	100.9
	July-September	106.0
	October-December	109.7

[2] Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."

[3] Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.

[4] April 1970 = 100.00.

[5] Previously known as the WHOLESALE PRICE INDEX, now the PRODUCER PRICE INDEX. The computation remains the same.

[6] Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

[7] Bulletin of Statistics, Department of Statistics, Pretoria.

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GOVERNMENT STATISTICS

UNITED STATES

	Producer Price Index— Industrial Commodities (1967 = 100)[1]	Producer Price Index— All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.75	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	115.08	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	125.79	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	132.34	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	140.05	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
Annual Avg. 1981	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
Annual Avg. 1982	312.3P	299.3P	289.1	207.15	12.31	12.90	9.98	8.17
Apr 1982	309.9	298.0	284.3	—	12.23	12.68	9.81	8.03
May 1982	309.6	298.6	287.1	—	12.25	12.71	9.83	8.05
Jun 1982	310.6	299.3	290.6	205.98	12.26	12.91	9.95	8.09
Jul 1982	312.8	300.4	292.2	—	12.23	12.91	10.02	8.18
Aug 1982	313.2	300.2	292.8	—	12.29	12.97	10.03	8.24
Sep 1982	312.7	299.3	293.3	208.51	12.53	13.46	10.20	8.31
Oct 1982	314.3	299.8	294.1	—	12.50	13.22	10.24	8.34
Nov 1982	315.0	300.3	293.6	—	12.52	13.18	10.28	8.38
Dec 1982	315.2R	300.7R	292.4	210.42	12.52	13.01	10.34	8.45
Jan 1983	314.0P	300.0P	293.1	—	12.62	13.29	10.35	8.48
Feb 1983	314.4P	301.2P	293.2	—	12.65	13.25R	10.43R	8.51R
Mar 1983	313.4P	300.5P	293.4	213.36P	12.57P	13.38P	10.41R	8.54R
Apr 1983	312.6P	300.8P	295.5	—	—	—	10.47P	8.52P

P = Preliminary R = Revised since last month

[1] US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2] US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3] US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4] US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5] Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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NUEXCO

REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
P.O. Box 70
7 Cliff Street
Milson's Point
NSW 2061, Australia
Telephone: (61-2) 929-6999
Telex: 73303 (ORATOM AA)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: 431-6031, 431-6025
Telex: 242-5060 (JATECH J)

SOUTH AFRICA

Chris I. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 8-9878

TAIWAN

Edward Bee
Bee & Liang Company, Limited*
8-G FL Jen AE Mansion
NOK 37 Jen AI Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: (886-2) 721-2117
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, North Carolina 28327
Telephone: (919) 949-3622

Joe L. Hixon*
302 Lombardy
Sugarland, Texas 77478
Telephone: (713) 494-3802

W. Hardy Prentice*
11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: (216) 631-2350

SPECIAL CONSULTANTS

Sanford C. Anderson
Palo Alto, California

Claus Thiesen
Kirkland, Washington

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

*Independent contractors representing Nuexco

7/23/83 B6800-1 A

NUEXCO

JULY 1983 NUMBER 179

Monthly Report on the Nuclear Fuel Market

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)
TWX: 910-373-1760 (NUEXCO MNPK)

J. Robert Wolcott
Chairman

George White, Jr.
President

Wayne D. Fowler
Senior Vice President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Thomas A. Boyden, V.P.

R. Wesley Miller, V.P.

Christian C. Guitton

Kim M. Peyton

Donald W. Radcliffe

Judith L. Sellers

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan
Senior Vice President

Kathryn K. Bowen

W. Scott Hickman

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Kenneth R. McCue, V.P.

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 500
Seven Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210
Telex: 4611142 (NUEX ATL)

M. Jerry Reaves, V.P.

(See inside back cover for list of Representatives and Consultants)

EXECUTIVE SUMMARY
REPORT 179

Exchange Value Unchanged at $23.50

The **Exchange Value** as of June 30, 1983 is **$23.50** per pound U_3O_8. Four spot or near-term uranium sales are reported, involving approximately 600 thousand pounds U_3O_8, *equivalent*. One transaction involved enriched UF_6, two involved U_3O_8, and the fourth involved natural UF_6 (plus SWUs in the longer-term portion).

Supply-Demand Ratio Increased to 2.6:1

Active spot and near-term **uranium supply** amounts to **6.0** million pounds U_3O_8, *equivalent*, approximately unchanged. **Active** spot and near-term **uranium demand** declined 25%, to **2.3** million pounds U_3O_8 equivalent. Therefore, the spot and near-term **supply-demand ratio** rose 37 percent, to **2.6:1**.

Transaction Value Rose $0.10 to $22.45

The **Transaction Value** as of June 30, 1983, is **$22.45** per pound U_3O_8. It includes 18 transactions involving a total of 2.4 million pounds equivalent U_3O_8 and covers a period of five months.

Conversion Value Unchanged at $1.20

The **Conversion Value** as of June 30, 1983 is **$1.20** per pound U as UF_6, unchanged since last month. No secondary market conversion transactions are reported. Active supply remains approximately four times active demand.

Loan Use Charge Rate Steady at 6%

The **Loan Use Charge Rate** as of June 30, 1983 is **6 percent** per annum. No loan transactions are reported.

SWU Values: FY 84 $103, Unchanged

As of June 30, 1983 the **SWU Value for FY84** is **$103 per SWU**, unchanged since last month, reflecting prices being offered by sellers of large quantities of Eurodif-origin SWUs. The few sellers of DOE-origin SWUs for FY84 delivery are offering in the range of $107-$110 per SWU. For FY85 delivery, some sellers are offering DOE-origin SWUs at a discount of approximately $15 from DOE's AFC price for FY85 and some are offering Eurodif-origin SWUs in the range of $110-$115 per SWU. However, the market for FY85 and beyond remains generally quiet, as buyers await DOE's announcement of the terms of conversion to the FR contract.

SWU Transactions

With this issue, Nuexco begins monthly reporting of recent transactions in the secondary SWU market.

Analysis & Commentary

US reactor cancellations are analyzed and units vulnerable to cancellation in the future are identified.

Italy

In the midst of a ten-year hiatus between start-ups of new nuclear power plants, Italy may have found a key to plant siting problems, but still lacks the sense of direction necessary to follow through on sound nuclear policy.

Australia

Uranium companies continue their efforts toward the development and marketing of uranium production in spite of obstacles presented by Labor Party policies.

Focus: Japan

Two aspects of Japan's nuclear power program stand out:
1. The desire to attain self-sufficiency throughout the fuel cycle.
2. Collectively, Japan's utilities own uranium inventories more than 100 million pounds equivalent U_3O_8 (in various forms up to and including UO_2) and are amply covered throughout the mid 1990s.

United States

1. Florida Power & Light to receive operating license for St. Lucie Unit 2, scheduled to begin operations later this summer.
2. NRC assured Consolidated Edison that Indian Point Units 2 and 3 will not be shut down for lack of emergency plan.
3. Congress considering legislation that would amend Price-Anderson Act, removing the current ceiling on liability for nuclear power plant operations.
4. Financial problems continue to hinder construction of WPPSS nuclear projects.

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3000 SAND HILL ROAD MENLO PARK, CALIFORNIA 94025
TELEPHONE: (415) 854-1510 TWX: 910-373-1760 (NUEXCO MNPK) TELEX: 470674 (NUEXCO UI)

NUEXCO REPORT 179 FIGURES OF THE MONTH (June 30, 1983)	This Month (Report 179)	Last Month (Report 178)	12 Months Ago (Report 167)
Exchange Value[1]	23.50	23.50	19.25
Transaction Value[1]	22.45	22.35	21.50
Conversion Value[2]	1.20	1.20	1.00
Loan Use Charge Rate[3]	6%	6%	6%
Near-Term Uranium Supply[4]	6.0	5.9	17.8
Near-Term Uranium Demand[5]	2.3	3.1	1.1
Near-Term Supply-Demand Ratio	2.6	1.9	16.2
Recent Transactions[6]:			
Number of Transactions	4	8	6
Quantity of material[7]	1.3-3.7	0.4-1.2	0.4-1.2
Nuexco SWU Value[8]:			
FY 84	103	103	—
USDOE SWU Prices[8]:			
AFC	138.65	138.65	130.75
Requirements	149.85	149.85	138.37
Market Value of Enriched UF_6[9, 10]			
2.5 w/o U_{235}	619.44	619.44	—
3.0 w/o U_{235}	792.80	792.80	—
3.5 w/o U_{235}	969.24	969.24	—
4.0 w/o U_{235}	1,147.96	1,147.96	—

---

[1] US $ per pound U_3O_8 equivalent.

[2] US $ per pound U as UF_6.

[3] Per annum.

[4] Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds U_3O_8 equivalent).

[5] Active inquiries to purchace, for delivery within 12 months after contract signing (millions of pounds U_3O_8 equivalent).

[6] Uranium sales only; does not include loans, conversion, or SWU transactions.

[7] Millions of pounds U_3O_8, equivalent.

[8] US $ per SWU.

[9] Calculated using the Nuexco Exchange Value, Conversion Value, and 0.20 percent tails assay. Calculations before 2/28/83 used the USDOE price for AFC SWUs. As of 2/28/83, calculations use the Nuexco SWU Value for the relevant fiscal year (currently FY 84).

[10] US $ per KgU as UF_6.

INDEX TO LAST MONTH'S REPORT (178)

Topic		Page
Analysis & Commentary	Update on US import Limitation efforts	18
Australia	Confusion in Labor Party's policies	13
Belgium	State acquired 50 percent of Synatom	14
Canada	Likely US utility reactions to hardening of Canadian upgrading policy	14
France	Likely cutbacks in nuclear program	14
Germany, Federal Republic	Nuclear program environment improved	15
South Africa	Tonnage-weighted index of working costs	16
Spain	Socialists proposed cancellation of 5 reactors	16
Speech	By Bob Wolcott, to General Electric 1983 Fuel Conference	Enclosure
United States	Reactor cancellations and delays	17
	Emergency Planning Regulations	17
Uranium Marketing and Prices	*Enriched Uranium and SWUs:*	
	Secondary market pricing in May 1983	1
	Natural Uranium and Conversion:	
	Pricing in May 1983	1

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NUEXCO

MONTHLY REPORT ON THE URANIUM MARKET

July 1983 No. 179

R. WESLEY MILLER, *EDITOR*

PRICING

Natural Uranium and Conversion 1
Enriched Uranium and SWUs 1

CURRENT MARKET DATA

Exchange Value and Transaction Value 3
Conversion Value and Loan Use Charge Rate 4
SWU Value 5
Prices Expressed in Selected Currencies 6
Transaction Summaries 8
Supply and Demand Tables 9

RECENT DEVELOPMENTS

Australia 13
Europe 13
United States 14

ANALYSIS AND COMMENTARY

US Reactor Cancellations—Past and Future 15

FOCUS

Uranium Demand and Supply in Japan 22

HISTORICAL MARKET DATA

Graph of Exchange Value and Transaction Value 32
Historical Exchange Value, Transaction Value and Conversion Value 33

GOVERNMENT STATISTICS

Australia 34
Canada 35
South Africa 36
United States 37

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FOREWORD

Nuexco is saddened by Maxie L. Anderson's recent death in a balloon crash. Chairman of Ranchers Exploration & Development Co., a company primarily known for work in gold, silver and copper, Maxie was one of the most innovative uranium marketing men in the business. Maxie was one of the first subscribers to the Nuexco Monthly Report and we enjoyed our association with him throughout the past 14-15 years. His ability to inspire his associates to achieve the levels of excellence that he too sought will be remembered by us all. We at Nuexco extend our sympathies to his family and colleagues. He will be missed.

* * *

Effective August 1, 1983 the time for release of the Nuexco Exchange Value and associated monthly market data will be changed to 12:01 AM (0001) California time on the first business day of the month, regardless of whether that day is a holiday in some parts of the world. The purpose of the change is to make the Exchange Value (and other pricing data, etc.) available to all customers during the same business day throughout the world. Our Asian and Australian customers will derive the most obvious benefits from this change, because the release time formerly used, 9 AM in New York, resulted in their receiving the Exchange Value, etc. well after their business day had ended.

In the event that a US holiday falls on the first business day of a given month, our representatives in other countries and our office in Europe will release the data on schedule. Any US customers desiring access to the Exchange Value, etc. may obtain it by calling our office in Europe. Our US offices will then release the data on the first US business day of the month.

* * *

Our customers can now contact Jerry Reaves in Nuexco's Atlanta office via telex. The number is 4611142; answerback is NUEX ATL.

* * *

As of August 1, 1983, Nuexco will begin transmitting monthly by telex *to all Category I subscribers* a summary of the most-requested current market data published in each month's Nuexco Report. Transmissions will take place as early as practicable on the first business day of each month. Please contact Wendy Boyden or Kathie Kuziel in our Menlo Park office to resolve any problems. For example, if you wish to insure timely receipt, you could contact Wendy or Kathie during July to verify your telex number. This service was received enthusiastically in a recent test, so we anticipate that our Category I subscribers will find it a welcome addition.

* * *

We are pleased to announce that, effective July 1, 1983, Wayne Fowler and Jim Vaughan have been elected Senior Vice Presidents of Nuexco, reflecting their years of contribution to the firm's success.

* * *

Last month, Report 178 of June 1983 contained a typographical error in the *Analysis and Commentary* article entitled, "Update on US Import Limitation Effects". In the second column, near the bottom of page 18, the first sentence of item 5 reads as follows:

"The nuclear fuel cycle is not widely believed to need protection for national security interests, so efforts to enact an important limitation are likely (sic) to gain favor with the public." The sentence should have indicated that those efforts are *unlikely* to gain favor, etc. Please correct your copies so as to prevent any unnecessary confusion.

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NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of June 30, 1983 is **$23.50** per pound U_3O_8, unchanged since last month. The *Current Market Data* section of this Report lists four uranium sales transactions, involving approximately 600 thousand pounds U_3O_8, *equivalent*. Those sales reflected the shift of the spot and near-term markets toward an integrated market involving natural UF_6, enriched UF_6 and enrichment services, as well as U_3O_8. One transaction involved enriched UF_6, two involved U_3O_8, and the fourth involved natural UF_6 (plus SWUs in the longer-term portion).

Active spot and near-term uranium supply (U_3O_8 or natural UF_6 offered at competitive prices, terms, and other conditions) amounts to **6.0 million** pounds U_3O_8 equivalent, approximately unchanged from last month. **Active spot and near-term uranium demand** declined 25 percent, to **2.3 million** pounds U_3O_8, equivalent. Therefore, the spot and near-term **supply-demand ratio** rose to 2.6:1, 37 percent higher than last month's level of 1.9.

The **Transaction Value** as of June 30, 1983, is **$22.45** per pound U_3O_8, equivalent, an increase of $0.10 since last month. The current Transaction Value includes 18 transactions involving a total of 2.4 million pounds U_3O_8 equivalent, and covers a period of five months.

* * *

The **Conversion Value** as of June 30, 1983 is **$1.20** per pound U as UF_6, unchanged from last month. No secondary market conversion transactions are reported this month.

Active supply of secondary market conversion services (active inquiries to sell secondary market conversion services for delivery within the next *three* years) totals **7.0** million pounds U. Similarly, **active demand** for secondary market conversion services amounts to **1.8** million pounds U. Active supply remains approximately four times active demand.

* * *

The **Loan Use Charge Rate** remained at **six percent** per annum. Nuexco is aware of at least three lenders holding a total of more than three million pounds available for loan as U_3O_8 at 6 percent per annum, but there are few potential borrowers. No loan transactions are reported this month.

* * *

Both the U_3O_8 and secondary conversion markets reflected a general lessening of activity by both buyers and sellers during June, as it led into a traditionally quiet time of the year. If past history holds true this year, market activity should begin to increase in early September.

ENRICHED URANIUM AND SWUS

As of June 30, 1983 the **SWU Value for FY 1984 is $103 per SWU,** unchanged from last month. As has been the case for some months, this price reflects the prices offered by sellers of large quantities of Eurodif-origin SWUs. Most potential sellers of DOE-origin SWUs for FY 1984 delivery have withdrawn from the market while awaiting DOE's announcement of the terms and conditions of conversion of their AFC contracts to the FR (Facility Requirements) form. Those DOE-origin SWUs that are available are being offered in the range of $107-$110 per SWU. As has characterized the secondary market for enrichment services for some time, the largest block of potential buyers are those holders of DOE requirements-type contracts having 3.5 year termination provisions. Thus, they are the only buyers who are able to terminate existing enrichment obligations and buy replacement SWUs economically on the secondary market.

Activity in the secondary SWU market dropped dramatically during much of June due to the decision by a number of potential buyers (holders of DOE requirements-type contracts having 3.5 year termination provisions) to delay secondary market participation and attempt to negotiate price reductions directly with DOE. Negotiations involved an interim agreement, wherein DOE would waive termination charges and allow these customers to purchase SWUs directly from DOE at the fixed-commitment price of $138.65 per SWU rather than the requirements contract price of $149.65. Included in such an arrangement would have been the customers' agreements to convert their requirements contract to the FR contract when such contract was offered formally later this summer.

Those negotiations have just recently been temporarily suspended by top DOE officials, who decided such efforts were premature until DOE concludes its ongoing review of its enrichment marketing efforts. That review is not scheduled for completion until some months in the future. Therefore, those potential buyers are once again actively reviewing offers to sell SWU on the secondary market, and a number of large transactions are expected to occur shortly.

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PRICING

The secondary market for FY 1985 and later remains quiet, as it has for the past few months. Many potential buyers, as well as most sellers of DOE-origin SWUs, continue to await DOE's announcement of the terms and conditions of conversion to the FR contract. That announcement is still expected in late July or early August. Active sellers of DOE-origin SWUs for FY 1985 delivery are offering at approximately $15 per SWU discount from DOE's AFC price for FY85 SWUs, yet to be announced. Prices offered by sellers of Eurodif-origin SWUs for FY 1985 delivery are in the range of $110 to $115 per SWU.

* * *

With this Report, Nuexco begins the monthly publication of summary data pertaining to recent transactions in the secondary SWU market. Appearing in the *Current Market Data* section, the data will be presented in a tabular form very similar to that used for uranium and conversion. Two aspects of the tabulation may need further explanation:

1. In reporting the delivery period, Nuexco will indicate, insofar as possible, the quarter(s) and calendar year(s), *not fiscal* year(s).
2. Choosing a price reference is difficult. In general, the price will vary according to delivery period, tails assay and origin of the SWUs. Nuexco has arbitrarily chosen to compare price to the current SWU Value. In months when Nuexco publishes more than one SWU Value, the one which is based on a delivery period nearest to the then-current Report date will be used. Also, Nuexco has arbitrarily chosen *not* to normalize prices to 0.2 percent tails assay (TA). Thus, in one sense, the prices are not at all comparable, as the SWU Value *does* refer to 0.2 percent TA. However, there is some evidence to suggest that market participants do not necessarily normalize prices to 0.2 percent TA either.

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EXCHANGE VALUE $23.50/lb. U_3O_8
Determined as of June 30, 1983

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1] In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2] Determined as of June 30, 1983			
$/lb. U_3O_8	**Millions of Pounds**	**Number of Transactions**	**Number of Months**
22.45	2.4	18	5

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

Comments

Nuexco does not consider the following in determining the Transaction Value:

A. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.
B. The price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of Exchange Value or any other independent variable. Also excluded from consideration are all data where the delivery price is defined in such a way that it cannot currently be determined.

[2] Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161. Corresponding data for 1982 are tabulated on page 5 of Report 173.

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CURRENT MARKET DATA

CONVERSION VALUE[1] $1.20/lb. U as UF_6
Determined as of June 30, 1983

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:

A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

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[1] Monthly data for 1981 and 1982 are tabulated on page 6 of Report 173.

LOAN USE CHARGE RATE[2] 6%
Determined as of June 30, 1983

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:

A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

---

[2] Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162. Monthly data for 1982 appear on page 2 of Report 173.

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CURRENT MARKET DATA

SWU VALUE $103/SWU for FY84
Determined as of June 30, 1983

Definition

The SWU (Separative Work Unit) Value is Nuexco's judgment of the price, expressed in US dollars per SWU, at which transactions for the sale of significant quantities of SWU of any origin for delivery in the specified DOE fiscal year could be concluded as of the last day of the month.

Derivation

Nuexco bases the SWU Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.
E. SWU prices at varying tails assays and varying product assays are converted to the equivalent SWU price at the DOE Reference Transaction Tails Assay (presently 0.20 weight percent U_{235}) and a product assay of three percent U_{235} assuming feed costs calculated using the Nuexco Exchange Value and Nuexco Conversion Value determined as of the last day of the same month.

Comments

Nuexco does not consider the following in determining the SWU Value:

A. The price of SWU delivered under long-term contracts from primary suppliers, such as DOE, Urenco, or Eurodif.
B. The price of SWU delivered under other than arm's length transactions.

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HISTORICAL MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	26.83	59.16	69.76
Belgium (comm. franc)	1,194	2,633	3,104
Canada (dollar)	28.86	63.62	75.02
Finland (markka)	130.34	287.35	338.85
France (franc)	179.54	395.82	466.76
FRG (mark)	59.81	131.86	155.50
Italy (lira)	35,445	78,143	92,149
Japan (yen)	5,635	12,424	14,651
Netherlands (guilder)	67.05	147.81	174.31
South Africa (rand)	25.67	56.59	66.73
Spain (peseta)	3,406	7,508	8,854
Sweden (krona)	179.66	396.09	467.09
Switzerland (franc)	49.45	109.02	128.57
UK (pound)	15.38	33.92	40.00
US (dollar)	23.50	51.81	61.09

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	25.63	56.51	66.64
Belgium (comm. franc)	1,141	2,515	2,966
Canada (dollar)	27.57	60.77	71.67
Finland (markka)	124.51	274.51	323.71
France (franc)	171.52	378.13	445.91
FRG (mark)	57.14	125.97	148.55
Italy (lira)	33,861	74,651	88,032
Japan (yen)	5,384	11,869	13,996
Netherlands (guilder)	64.05	141.21	166.52
South Africa (rand)	24.52	54.06	63.75
Spain (peseta)	3,254	7,173	8,459
Sweden (krona)	171.64	378.39	446.22
Switzerland (franc)	47.24	104.15	122.82
UK (pound)	14.70	32.40	38.21
US (dollar)	22.45	49.49	58.37

[1] Calculated using currency exchange rates published in the Wall Street Journal on June 30, 1983.

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HISTORICAL MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6	per kg U as UF_6
Australia (dollar)	1.37	3.02
Belgium (comm. franc)	60.98	134.43
Canada (dollar)	1.47	3.25
Finland (markka)	6.66	14.67
France (franc)	9.17	20.21
FRG (mark)	3.05	6.73
Italy (lira)	1,810	3,990
Japan (yen)	287.77	634.42
Netherlands (guilder)	3.42	7.55
South Africa (rand)	1.31	2.89
Spain (peseta)	173.91	383.41
Sweden (krona)	9.17	20.23
Switzerland (franc)	2.53	5.57
UK (pound)	0.79	1.73
US (dollar)	1.20	2.65

SWU VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	FY 1984 per SWU
Australia (dollar)	117.61
Belgium (comm. franc)	5,234
Canada (dollar)	126.47
Finland (markka)	571.27
France (franc)	786.92
FRG (mark)	262.15
Italy (lira)	55,354
Japan (yen)	24,700
Netherlands (guilder)	293.87
South Africa (rand)	112.51
Spain (peseta)	14,928
Sweden (krona)	787.46
Switzerland (franc)	216.75
UK (pound)	67.43
US (dollar)	103.00

[1] Calculated using currency exchange rates published in the Wall Street Journal on June 30, 1983.

CURRENT MARKET DATA

TRANSACTION SUMMARY[1]

Uranium Transactions

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
2350	1983-85	1001-3000	95	European Entity	European Utility	UF_6
2384	1984	101-300	Approx. 99	European Entity	European Utility	Enriched UF_6
2396	1983	51-100	100	US Producer	US Producer	
2399	1984	101-300	indeterminate	US Producer	European Utility	Price related to market

Conversion Transactions none reported

Loan Transactions none reported

RECENT SWU TRANSACTIONS[1]

Nuexco Transaction Number	Delivery Period[2]	Approximate Quantity (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value	Tails Assay (Percent U_{235})	Buyer Group	Seller Group	SWU Origin	Remarks
2350B	3Q85	50-100	115	0.3	Europe	Europe	Eurodif	
2359	1Q84	less than 50	109	0.2	US	Europe	Eurodif	
2397	1985	25-50	indeterminate	0.3	US	US	DOE	Barter

---

[1] Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

[2] Q refers to quarter of calendar year, *not* fiscal year.

[3] Price is *not* normalized to 0.20% tails assay.

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URANIUM SUPPLY
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
	Spot or Near-term[2]	Intermediate or Long-term[3]	
Available for Sale:			
ACTIVE			
1575		500 per year	Long Term
1818		250 per year	Long Term
2017		2,300	
2038	2,000		UF_6
2134		300 per year	1984 on
2162	100		Primarily UF_6
2191	125		UF_6
2193		800 per year	1986-90
2201	30		
2203	1,200		
2219	200		Enriched UF_6
2220	150		UF_6
2235		100 per year	1985-87
2236		200 per year	1985-89
2246	40	100	
2275	80		
2277	200		U_3O_8 or UF_6
2297	60	200 per year	1985-89
2299	130		UF_6
2307	900		UF_6
2315	450		UF_6
2320	350		UF_6
TOTAL:	6,015		
INACTIVE			
1877	40		
2196	500		
2271		500 per year	1984-88
TOTAL:	540		

[1] Measured from the date of this Report

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CURRENT MARKET DATA

URANIUM DEMAND
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
	Spot or Near-term[2]	Intermediate or Long-term[3]	
Inquiries to Purchase:			
ACTIVE			
1871		250 per year	1984-86
1996	400		
2010		400 per year	1984-92
2061	15		
2071	70		UF_6
2114		75 per year	1984 on
2115		200 per year	1986 on
2167	250	250+ per year	1984-99
2187	50		
2188		250 per year	1985 on
2214	400		UF_6
2233	700		1984, U_3O_8 or UF_6
2240	100		
2244		350 per year	1985 on
2277	50		U_3O_8 or UF_6
2278	250		U_3O_8 or UF_6
2304		500 per year	1988 on
TOTAL:	2,285		
INACTIVE			
1459		200 per year	Long Term
1888		400 per year	Long Term
1999		50 per year	1985-90
2025		350	

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[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CONVERSION SUPPLY
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	Within 3 Years	Beyond 3 Years	
ACTIVE			
1609	1,500		
1840	130		
1936	1,500	200 per year	Long Term
2051	1,500		
2141	1,500		
2143	400		
2220	400		
2222	100	175	
TOTAL:	7,030		
INACTIVE			
2008	800	800	
2181	650	650 per year	Long Term
2230	300		
TOTAL:	1,750		

CONVERSION DEMAND
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6)		Remarks
	Within 3 Years	Beyond 3 Years	
ACTIVE			
2129	900		
2135	400	135 per year	1986-87
2199	450	300 per year	1986 on
TOTAL:	1,750		
INACTIVE			
2190	400	200 per year	1986 on
2194		300 per year	1986 on
2295	250		
TOTAL:	650		

[1] Measured from the date of this Report.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1938	1,500		UF_6
2121	600		
2128	2,500		
2205	300		
TOTAL:	4,900		
INACTIVE			
1815	1,000		UF_6
1884	600		
2036	500		UF_6
2139	2,000		
TOTAL:	4,100		
Inquiries to Borrow:			
ACTIVE			
1998	200	200	
2006	600		
2118	250		U_3O_8 or UF_6
TOTAL:	1,050		
INACTIVE	None		

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[1] Measured from the date of this Report

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AUSTRALIA

Some factions of the Australian Labor Party (ALP) resented the Prime Minister's pronouncements, during his recent world tour, of foreign policy decisions seemingly contrary to the ALP platform. Their reaction forced him to announce the suspension of uranium shipments to France until nuclear testing in the Pacific is discontinued. Opposition to nuclear weapons testing is strong in Australia, so the move should be popular at first. However, the use of uranium trade restrictions as a political weapon will make it much more difficult for uranium producers to persuade potential buyers to regard Australia as a reliable supplier. Meanwhile France has initiated diplomatic consultations, an act that could help Mr. Hawke to ease the tension inside the ALP.

* * *

The South Australian state government (ALP) has recently approved the environmental impact statement for the development of the copper-uranium-gold project at Olympic Dam (Roxby Downs). Immediately upon the receipt of approval the project partners, Western Mining Corp. and BP Australia initiated the construction of an 18 million dollar pilot plant to test the treatment options for the complex multi-metal ore. The pilot plant will take approximately six months to build and will have a project life of approximately six months. The partners estimate that the feasibility study will take an additional six to eight months.

Underground development is underway; the developers expect to achieve 1.5 KM of tunnelling in ore this year. The earliest possible starting date for production is 1988, but that date is quite tentative, pending the results of the feasibility study.

EUROPE

Italy, in the midst of a ten-year hiatus between start-ups of new nuclear power plants, may have found a key to plant siting problems, but still lacks the sense of direction necessary to follow through on sound nuclear policy.

In January of this year, the Parliament passed a law granting direct financial incentives to towns and regions agreeing to accept the siting of two 1,000 MWe nuclear units. ENEL (Ente Nazionale per l'Energia Elettrica) currently has three operating nuclear units comprising about 1,300 MWe, generating almost two percent of Italy's electricity. The national energy plan established a goal of 21.5 percent electricity from nuclear power by 1992, but heretofore, siting problems have presented a major hurdle to increasing the percentage of nuclear power. The new incentives have already led to serious discussions regarding the siting of new nuclear power plants between the federal government and the regions of Lombardi, Piedmont and Apuglia. Six other areas are awaiting the results of preliminary siting studies in hopes of participating in the financial benefits.

It would be premature to conlcude that Italy's nuclear power program is preparing for a great leap forward. The recent election of Italy's 44th parliament since World War II may have negated the progress made so far this year. Historically, because they involve relatively long lead times and large capital expenditures, nuclear power programs flourish under centralized, secure governments. It appears that the future of nuclear power in Italy will continue to be hampered by political instability and the double-digit inflation which can dramatically alter the economics of long-term capital-intensive projects. It is doubtful that any long-term economic reforms will be forthcoming from the new coalition. The losses suffered by the Christian Democrats, while not directly detrimental to the nuclear power program in Italy, may weaken the economic foundations of a program which was beginning to look promising again.

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RECENT DEVELOPMENTS

UNITED STATES

Early this month, the Nuclear Regulatory Commission (NRC) announced that Florida Power and Light will receive a full operating license for its St. Lucie Unit 2, scheduled to begin operations later this summer. At the same time, the Senate Appropriations Subcommittee recommended against providing construction funds for the Clinch River Breeder Reactor during fiscal year 1984. The US Congress approved the project in 1972, however, as the estimated cost of the project has decreased, the possibility for construction is becoming remote.

* * *

As noted last month in the discussion of the Indian Point Units 2 and 3 emergency planning deficiencies, the NRC has assured Consolidated Edison that the units will not be shut down in the immediate future for lack of an emergency plan. The NRC decision, based on a 3-2 vote in favor of continued operation, was apparently influenced strongly by a Federal Emergency Management Agency (FEMA) report which concluded that progress toward an acceptable emergency plan was being made. The NRC is awaiting the findings of its special licensing board studying the safety of the station. The board is scheduled to forward its recommendations to the NRC in late August. It is unlikely that any further action will be forthcoming in the next 2-4 months.

* * *

Legislation to amend the Price-Anderson Act of 1957 has been introduced into Congress. The original Act has been extended twice and is now scheduled to expire in 1987. The proposed legislation, if successful, would remove the current ceiling on liability for nuclear plant operation. The authors of the bill suggest that the removal of the ceiling would encourage nuclear power plant safety by holding their operators fully responsible for their actions. In the event the Act is modified, or the ceiling is removed, it is likely that private insurance will be made available in sufficient amounts to compensate for foreseeable events.

* * *

The financial problems of the Washington Public Power Supply System (WPPSS) continue to hinder the construction of its nuclear projects. WPPSS once planned to build 5 nuclear units at an estimated cost of $4.1 billion. (See Report No. 162, page 13.) That estimate has risen to $23 billion, nearly six times the original projections.

At present, Unit 1 is 63 percent complete and construction was halted in April 1982; Unit 2 is 96 percent complete and fuel loading is scheduled for September 1983. The cost to complete the unit is estimated at $150 million. Unit 3 is 74 percent complete and will need an estimated $950 million in additional capital expenditures. Mothballing of this unit is estimated to cost between $300 to $700 million. The Executive Board has voted to halt all construction on Unit 3 for the next three years. Units 1, 2 and 3 are now backed through financial agreements with the Bonneville Power Administration (BPA), a federal energy distribution agency. This backing by the BPA means that Units 1, 2 and 3 still have a reasonable chance for commercial operation, in spite of the low power demand currently in the Northwest.

Units 4 and 5 were cancelled after nearly $2.25 billion in tax-exempt bonds were issued. The 88 northwestern utilities participating in Units 4 and 5 are now involved in a court dispute, as in June the interest payments associated with those bonds were missed. Such action could signal still more controversies in the future of these two units, with the prospect of bankruptcy certainly more serious than before. At least $70 to 100 million in negotiable assets are held by Units 4 and 5. One must wonder what effect a sudden sell-off of those assets would have on the fuel market.

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US REACTOR CANCELLATIONS, PAST AND FUTURE

Introduction

From time to time, Nuexco has reported cancellations of individual reactor plant orders and the past two year end reviews have summarized some of them (Report 161 of January 1982 and Report 173 of January 1983). This article presents a list of all the nuclear reactor orders canceled by US utilities since 1972, summarizes a DOE report analyzing the reasons for those cancellations, and finally, examines the potential for future cancellations.

Summary of Cancellations

The first commercial order for a nuclear steam supply system (NSSS) in the USA was placed in 1953. The first cancellations of nuclear units occurred in 1972. As of June 30, 1983, 101 of the 251 orders placed had been canceled. Furthermore, 65 of those cancellations have taken place since 1978, the last year that any US utility placed an order for a nuclear steam supply system (NSSS). Table 1 lists all US reactor orders canceled from 1972 through June 30, 1983.

Reasons for Cancellations

A recent report issued by DOE's Energy Information Administration (EIA), *Nuclear Plant Cancellations: Causes, Costs and Consequences*, analyzes reasons for the projects' cancellations and identifies potential future cancellations. The report listed five major reasons for cancelling nuclear units as cited by the constructing utility or regulatory commission:

1. lower forecasted load growth;
2. financial constraints;
3. regulatory changes and uncertainty;
4. reversal of economic advantage;
5. denial of certification by the state government.

Most of the 101 cancellations involved two or more of those reasons. Approximately half mentioned lower forecasted load growth. There has been a continuous downward trend in long-term load growth projections since 1973. Many utilities have chosen to cancel rather than defer nuclear units, because the ultimate cost of the unit becomes increasingly uncertain as deferral periods lengthen.

The problem of financial constraints primarily applies to investor-owned utilities; publicly-owned utilities have more flexibility to raise rates to cover increased costs. Eighty-eight of the 101 canceled units were being built by investor-owned utilities; five units were said to have been canceled solely because financing was not available on reasonable terms.

Regulatory changes and uncertainty was given as a primary reason for cancelling 38 nuclear units. In almost every case citing this reason, either financial constraints or reversal of economic advantage was also cited as a reason. Regulatory delays lengthen planning and lead times and changing design requirements involve construction changes; both lead to increased costs.

Five units were canceled solely because of reversal of economic advantage. Most utilities made their initial commitments to canceled nuclear units between 1967 and 1977. Nuclear capital costs have escalated faster than coal-fired plant costs since then, eroding nuclear power's advantage over coal. In 1982, another EIA study, *Projected Costs of Electricity from Nuclear and Coal-fired Power Plants*, concluded that "new nuclear plants entering service in 1995 would offer a significant cost advantage over coal-fired plants only in New England and the South Atlantic Regions." In its conclusion, the EIA report stated: "Because the completion of many of these plants could result in the displacement of electricity generated by oil and natural gas, thereby reducing the Nation's oil imports, this situation may not serve the best interest of electricity consumers or the Nation at large."

Potential Future Cancellations

In Report 161 of January 1982, Nuexco's review of nuclear power developments in the USA in 1981 contained the following discussion of reactor cancellations:

> *The underlying problem with the US uranium market, insufficient consumption, was aggravated in 1981. Only three full power operating licenses were granted during the year. During the same period, six reactors were canceled and twenty-one others were delayed . . . .*
>
> *The cancellation of Hope Creek Unit 2 was especially important because the plant was 18 percent complete . . . . Before Hope Creek 2, the only cancellation of a unit significantly greater than one percent complete had been that of North Anna 4 in 1980, when it was 13 percent complete.*
>
> *It is Nuexco's opinion that there will be additional utility decisions to cancel at least fourteen reactors due to financial and political considerations . . . . Reactors having a low percentage completion are, all other things being equal, more vulnerable to cancellations*

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ANALYSIS & COMMENTARY

> *than others. However, the cancellations of North Anna 4 and Hope Creek 2 indicate that cancellations of units up to 20 percent complete are possible. It is Nuexco's opinion that the cancellations of units up to 40 percent complete are not out of the question. . . . 28 reactors under construction in the US fall into the high-risk category of less than 20 percent complete. Nuexco believes at least fourteen more cancellations will take place in the next few years; not necessarily all of those expected cancellations are in the high-risk category.*

Accompanying that discussion of nuclear power developments in 1991 was a tabulation of US nuclear reactors then under construction, in which they were arranged in descending order of completion percentage *at the time*. The discussion called attention to the 44 units that were less than 40 percent complete as of June 30, 1981. Since that time, 36 of those 44 units have suffered cancellation or indefinite deferral or are presently considered "at risk" by the EIA. Only eight have come through the period relatively unscathed. Table 2 in this Report lists, in the same order in which they appeared in Report 161, those 44 reactors that were less than 40 percent complete as of June 30, 1981. Table 2 also indicates which reactors have since been canceled, indefinitely deferred, or designated as "at risk" by the EIA.

During the past eighteen months, 16 of the 28 units in the so-called "high-risk" category of less than 20 percent complete have been canceled. Eleven of the remaining 12 units in that category are considered "at risk" by the EIA, because they still are less than 20 percent complete. Only one unit of the 28, Georgia Power Company's Vogtle Unit 1, has maintained relatively high prospects for completion.

In that article in Report 161, Nuexco also mentioned that cancellations of units 20 to 40 percent complete were not out of the question. In the past eighteen months, two of the 16 units in that lesser-risk category have been cancelled (Tennessee Valley Authority's Phipps Bend Unit 1 and Washington Public Power Supply System's WNP Unit 4). Three more in that category have been indefinitely deferred; according to the EIA study, those three and three more are "at risk." Thus, at least nine of the 16 units in that category have suffered major setbacks of some kind, such that they have been canceled or become quite vulnerable to cancellation.

The EIA study identified a Base Case and Worst Case list of nuclear units currently under construction which are at risk. The thirteen Base Case units are those less than 20 percent complete at the end of 1981. The five Worst Case units are considered at risk for political and other reasons.

The Base Case units represent 14,726 MWe capacity and annual uranium consumption of approximately 4.8 million pounds U_3O_8, equivalent for reloads. The Worst Case units total 6,056 MWe capacity and annual uranium reload consumption of 2 million pounds. Thus, these two groupings of units vulnerable to cancellation represent uranium consumption of nearly 7 million pounds equivalent U_3O_8 per year.

Conclusion

Having taken in to consideration the likelihood of several more US reactor cancellations, Nuexco's forecasts would be little affected if the 18 units considered "at risk" by the EIA were canceled. However, the cost to the US utility industry and, ultimately, to the US electricity consumers could reach into the billions of dollars.

The near future of commercial nuclear power in the USA includes further nuclear plant cancellations and no new plant orders. The worst may be over, but the outlook is far from encouraging.

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Table 1
NUCLEAR REACTOR CANCELLATIONS BY U.S. UTILITIES SINCE 1972

Year of Cancellation	Nuclear Unit	Net Design MWe	Utility[1]
1972	Bell Station	838	New York State Electric and Gas
	Crystal River 4	897	Florida Power Corporation
	Malibu	462	Los Angeles Department of Water and Power
	Verplank 1	1,115	Consolidated Edison
	Verplank 2	1,115	Consolidated Edison
	Perryman 1	845	Baltimore Gas and Electric
	Perryman 2	845	Baltimore Gas and Electric
1973	None	—	—
1974	Tyrone 2	1,150	Northern States Power
	Vidal 1	770	Southern California Edison
	Vidal 2	770	Southern California Edison
	Vogtle 3	1,113	Georgia Power
	Vogtle 4	1,113	Georgia Power
	Quanicassee 1	1,150	Consumers Power
	Quanicassee 2	1,150	Consumers Power
1975	Fulton 1	1,160	Philadelphia Electric
	Fulton 2	1,160	Philadelphia Electric
	Fermi 3	1,171	Detroit Edison
	St. Rosalie 1	1,160	Louisiana Power and Light
	St. Rosalie 2	1,160	Louisiana Power and Light
	Barton 3	1,159	Alabama Power
	Barton 4	1,159	Alabama Power
	Summit 1	770	Delmarva Power and Light
	Summit 2	770	Delmarva Power and Light
	Orange 1	1,300	Florida Power Corporation
	Orange 2	1,300	Florida Power Corporation
	Somerset 1	1,200	New York State Electric and Gas
	Somerset 2	1,200	New York State Electric and Gas
1976	Allens Creek 2	1,150	Houston Lighting and Power
1977	Douglas Point 1	1,146	Potomac Electric Power
	Douglas Point 2	1,146	Potomac Electric Power
	Sears Isle	1,150	Central Maine Power
	South Dade 1	1,100	Florida Power and Light
	South Dade 2	1,100	Florida Power and Light
	Surry 3	859	Virginia Electric Power
	Surry 4	859	Virginia Electric Power
	Ft. Calhoun 2	1,136	Omaha Public Power District
	Barton 1	1,159	Alabama Power
	Barton 2	1,159	Alabama Power

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[1] In cases where there is more than one owner, the constructing utility is listed.

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Year of Cancellation	Nuclear Unit	Net Design MWe	Utility[1]
1978	North Coast 1	583	Puerto Rico Water Resources Authority
	Sundesert 1	974	San Diego Gas and Electric
	Sundesert 2	974	San Diego Gas and Electric
	Blue Hills 1	918	Gulf States Utilities
	Blue Hills 2	918	Gulf States Utilities
	Zimmer 2	1,170	Cincinnati Gas and Electric
	Atlantic 1	1,150	Public Service Electric and Gas
	Atlantic 2	1,150	Public Service Electric and Gas
	Atlantic 3	1,150	Public Service Electric and Gas
	Atlantic 4	1,150	Public Service Electric and Gas
	Haven 2	900	Wisconsin Electric Power
	South River 1	1,150	Carolina Power and Light
	South River 2	1,150	Carolina Power and Light
	South River 3	1,150	Carolina Power and Light
1979	Greene County	1,212	Power Authority State of New York
	Tyrone 1	1,100	Northern States Power
	Palo Verde 4	1,270	Arizona Public Service
	Palo Verde 5	1,270	Arizona Public Service
	NEP 1	1,150	New England Power and Light
	NEP 2	1,150	New England Power and Light
	Stanislaus 1	1,200	Pacific Gas and Electric
	Stanislaus 2	1,200	Pacific Gas and Electric
1980	Davis-Besse 2	906	Toledo Edison
	Davis-Besse 3	906	Toledo Edison
	Erie 1	1,267	Toledo Edison
	Erie 2	1,267	Toledo Edison
	Jamesport 1	1,150	Long Island Lighting
	Jamesport 2	1,150	Long Island Lighting
	New Haven 1	1,250	New York State Electric and Gas
	New Haven 2	1,250	New York State Electric and Gas
	Sterling	1,150	Rochester Gas and Electric
	Haven 1	900	Wisconsin Electric Power
	Greenwood 2	1,264	Detroit Edison
	Greenwood 3	1,264	Detroit Edison
	Forked River 1	1,070	Jersey Central Power and Light
	North Anna 4	907	Virginia Electric Power
	Montague 1	1,150	Northeast Utilities
	Montague 2	1,150	Northeast Utilities

[1] In cases where there is more than one owner, the constructing utility is listed.

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Year of Cancellation	Nuclear Unit	Net Design MWe	Utility[1]
1981	Bailly	644	Northern Indiana Public Service
	Pilgrim 2	1,150	Boston Edison
	Callaway 2	1,120	Union Electric
	Harris 3	900	Carolina Power and Light
	Harris 4	900	Carolina Power and Light
	Hope Creek 2	1,067	Public Service Electric and Gas
1982	WNP 4	1,218	Washington Public Power Supply System
	WNP 5	1,240	Washington Public Power Supply System
	Black Fox 1	1,150	Public Service of Oklahoma
	Black Fox 2	1,150	Public Service of Oklahoma
	Perkins 1	1,280	Duke Power
	Perkins 2	1,280	Duke Power
	Perkins 3	1,280	Duke Power
	Vandalia	1,270	Iowa Power and Light
	Pebble Springs 1	1,260	Portland General
	Pebble Springs 2	1,260	Portland General
	Hartsville B1	1,233	Tennessee Valley Authority
	Hartsville B2	1,233	Tennessee Valley Authority
	Phipps Bend 1	1,233	Tennessee Valley Authority
	Phipps Bend 2	1,233	Tennessee Valley Authority
	Allens Creek 1	1,150	Houston Lighting and Power
	Cherokee 2	1,280	Duke Power
	Cherokee 3	1,280	Duke Power
	North Anna 3	907	Virginia Electric Power
1983	Cherokee 1	1,280	Duke Power

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[1] In cases where there is more than one owner, the constructing utility is listed.

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Table 2

US NUCLEAR POWER REACTORS UNDER CONSTRUCTION (WHICH WERE LESS THAN 40 PERCENT COMPLETE AS OF 6/30/81)[1]

Reactor	Utility	Percent Complete[1]	Estimated COD[1]	Status
Nine Mile Point 2	Niagara Mohawk Power Corp.	38	10/86	
Millstone 3	Northeast Utilities	36	5/86	
Hope Creek 1	Public Service Electric & Gas (PSEG)	35	12/86	
**Hartsville A1	Tennessee Valley Authority (TVA)	34	7/88[2]	Indefinitely deferred. Now "at risk".
Catawba 2	Duke Power Co.	32	9/85	
River Bend 1	Gulf States Utilities Co.	31	4/84	
WNP 3	Washington Public Power Supply System (WPPSS)	30.6	12/86	
**Limerick 2	Philadelphia Electric Co.	27.5	10/87	Currently "at risk".
Phipps Bend 1	TVA	27	2/89[3]	Cancelled.
**Hartsville A2	TVA	26	4/89[2]	Indefinitely deferred. Now "at risk".
**Yellow Creek 1	TVA	26	4/88[2]	Indefinitely deferred. Now "at risk".
Marble Hill 1	Public Service of Indiana	25	late 86	
WNP 4	WPPSS	24.2	6/87[3]	Cancelled.
*South Texas Project 2	Houston Lighting & Power	23	—/86	"At risk".
**Grand Gulf 2	Mississippi Power & Light	22.4	9/86	"At risk".
Palo Verde 3	Arizona Nuclear Power Project (ANPP)	21	5/86	
Vogtle 1	Georgia Power Co.	18	5/85	
Hartsville B1	TVA	17	Indef[3]	Cancelled.
WNP 5	WPPSS	13.7	12/87[3]	Cancelled.
*Marble Hill 2	Public Service of Indiana	11	late 87	"At risk".
*Vogtle 2	Georgia Power Co.	10	11/86	"At risk".
North Anna 3	Virginia Electric & Power Co.	08.8	—/89[3]	Cancelled.
*Seabrook 2	Public Service Co. of New Hampshire	08	5/86	"At risk".
Hartsville B2	TVA	07	Indef[3]	Cancelled.
Phipps Bend 2	TVA	05	Indef[3]	Cancelled.
*Shearon Harris 2	Carolina Power & Light Co.	03	3/88	"At risk".
*Yellow Creek 2	TVA	03	Indef[2]	Indefinitely deferred. Now "at risk".
Black Fox 1	Public Service Co. of Oklahoma	0-1wa[5]	7/91[3]	Cancelled.
Black Fox 2	Public Service Co. of Oklahoma	0-1wa[5]	7/94[3]	Cancelled.
*Clinton 2	Illinois Power Co.	0-cp[6]	Indef	"At risk".
Allens Creek	Houston Light & Power	0	—/91[3]	Cancelled.
*Carroll County 1	Commonwealth Edison Co.	0	Indef	"At risk".
*Carroll County 2	Commonwealth Edison Co.	0	Indef	"At risk".

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*Cherokee 1	Duke Power Co.	0	Indef[4]	Cancelled.
Cherokee 2	Duke Power Co.	0	Indef[3]	Cancelled.
Cherokee 3	Duke Power Co.	0	Indef[3]	Cancelled.
Pebble Springs 1	Portland General Electric Co.	0	9/88[3]	Cancelled.
Pebble Springs 2	Portland General Electric Co.	0	9/90[3]	Cancelled.
Perkins 1	Duke Power Co.	0	Indef[3]	Cancelled.
Perkins 2	Duke Power Co.	0	Indef[3]	Cancelled.
Perkins 3	Duke Power Co.	0	Indef[3]	Cancelled.
*River Bend 2	Gulf States Utilities Co.	0	Indef	"At risk".
*Skagit-Hanford 1	Puget Sound Power & Light	0	—/91	"At risk".
*Skagit-Hanford 2	Puget Sound Power & Light	0	—/93	"At risk".

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*Considered "at risk by DOE's Energy Information Administration because reactor was less than 20 percent complete as of 12/31/81.

**Considered "at risk" by EIA for political and other reasons.

[1] Nuclear News World List of Nuclear Power Plants

[2] Indefinitely deferred in 1982

[3] Cancelled in 1982

[4] Cancelled in 1983

[5] Limited work authorization

[6] Construction permit

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FOCUS

URANIUM DEMAND AND SUPPLY IN JAPAN

Introduction

Japan has one of the world's most active nuclear programs. However, it has suffered the same types of delays that have affected those of other countries. Thus, its objectives have been reduced considerably during the past decade. From the optimistic projections prevalent prior to the 1973-74 energy crisis, Japan has, in several stages, reduced its targets for the nuclear generation of electricity and related services to more realistic levels. Although *official* government estimates are still somewhat optimistic, one can predict with reasonable accuracy Japan's needs for uranium over the next decade. This article presents an analysis of Japan's balance of uranium supply demand, based on the present status of nuclear plant licensing and of economic, environmental, and technological factors. In addition, this article projects the probable future activity of the Japanese utilities in the international market for uranium and related services.

Overview

During its 25-year history, Japan's national program for nuclear power generation has been based primarily on the light water reactor (LWR). In the early 1970s, government and utility planning called for installed nuclear capacity in excess of 60,000 MWe by 1985. Subsequently, the nuclear industry has had to face the same realities encountered by other industrial nations implementing nuclear programs. Japan has also had to grapple with problems related to siting, environment, economic growth, non-proliferation safeguards, safety and technology, and perhaps more than other nations, a public intensely sensitive to nuclear power. By the late 1970s, Japan had essentially halved its objective for 1985 installed nuclear capacity, revising the target to 30,000 MWe. The presence of only minor uranium deposits dictated that Japanese utilities base their uranium procurement policies entirely on imports from overseas. Primarily due to the optimistic forecasts of the early and mid-1970s, Japanese utilities entered into a series of large, long-term contracts to satisfy the major portion of their uranium needs through the 1980s. Emphasizing geographical diversity, Japanese utilities established relationships with a number of overseas suppliers. Additionally, the nuclear industry made commitments to actively pursue the exploration, development, and production of uranium in overseas uranium projects, either by direct participation or by providing financing in exchange for sharing in the output of such projects.

Japan's dependence on imports has not been limited to the supply of uranium. To a large degree, LWR technology was introduced from overseas via licensing arrangements. Readily assimilated by Japan's major companies, that technology today forms the foundation for a self-sufficient domestic industry for the supply of hardware and systems for nuclear generating facilities. However, for the initial and current supply of conversion, enrichment and reprocessing services, Japan has found it necessary to rely on long-term contract commitments from Europe and the USA. Japan has a defined program to develop self-sufficiency throughout the fuel cycle in which technology demonstration projects have been completed. However, commercial-scale production facilities are not scheduled for completion until the late 1980s or early 1990s.

Japan also has completed projects to demonstrate the technology for an Advanced Thermal Reactor (ATR) and a Fast Breeder Reactor (FBR). Plans are being implemented to construct larger plants of the same types. Objectives are to permit the use of slightly enriched uranium, mixed oxide fuels and plutonium to reduce future uranium needs. Similarly, the testing of mixed oxide fuels in LWRs is being initiated for the same purpose. Plans call for these programs to become commercially useful in the 1990s.

Nuclear Power Generation

Japan's current installed capacity for nuclear generation of electricity (as shown in Table 3) consists of 24 units having a total capacity of 17,177 MWe. The total does not include the 165 MWe ATR demonstration plant. Figure 1 shows the geographical distribution of Japan's installed nuclear power plants.

Although accounting for only 13 percent of Japan's total 1982 installed generating capacity of 135,000 MWe, nuclear plants actually generated 20.5 percent of Japan's total electricity consumption of more than 102 million MWH. Official 1982 Japanese government estimates of generating costs are summarized in Table 6. Even with recent reductions in the price of oil and increased construction costs of nuclear plants, nuclear generation of electricity is expected to play a continuing and expanding role in Japan's energy needs. The Japan Atomic Industrial Forum reports that Japan's 12 Boiling Water

Reactors (BWR) and 11 Pressurized Water Reactors (PWR) also established in 1982 a new record of 67.7 percent capacity factor, and 68.2 percent availability. Without the annual shutdowns mandated for inspections and maintenance, unique to Japan, those percentages could have reached as much as 95 percent. In May, 1983 Tokyo Electric Power Company's (TEPCO) Fukushima II-1 plant established a new LWR record of 400 days in continuous operation.

Overall economic planning by the Japanese government in April 1983 projects that nuclear generation will account for 30 percent of Japan's electricity with an installed capacity of approximately 46,000 MWe in 1992. However, as noted in Report 175 of March 1983, Japanese utilities announced a prediction of "realistic" capacity of 37,350 MWe by 1991. The utility estimate tends to be supported by reference to Table 4. Listed are current Japan LWR plants by categories of "Under Construction", "In Licensing", and "Submitted to EPRDCC" (Electric Power Resources Development Coordination Council). EPRDCC is a governmental council which reviews the utility-proposed plant location and capacity for conformance to overall national economic planning and the need for additional generating capacity. The same EPRDCC review also includes a preliminary environmental review and public hearing at the location of the proposed plant. Only after EPRDCC approval is a proposed plant considered an actual project and eligible for safety and license approval review.

Reference to Table 4 indicates an additional firm total of approximately 21,357 MWe capacity which is planned to be operational by 1991. Assuming completion as scheduled, that total combined with the 17,177 MWe currently operating would equal 38,534 MWe by 1992. That total could go as high as 46,000 MWe by 1992 if, as shown in Table 5, several of the plants planned by utilities but not yet submitted to the EPRDCC could be completed on schedule. Several factors, however, tend to compromise the possibility of achieving the higher 1992 goal. First, licensing schedules historically have been subject to delay. Second, reduced load growth due to current economic conditions may lessen the need for the additional capacity, or at least retard it beyond the indicated schedule. Within the first four months of 1983, Japan's utilities announced delays of 3-12 months for 6 of the 18 plants currently under construction or licensing. As in other parts of the world, reduced need for the additional capacity prompted their actions. Furthermore, as energy conservation measures and slower economic growth have led to reduced power sales, utilities have begun to experience lower profits and the resulting cash flow problems.

Japan's Uranium Balance

Based on nuclear generation forecasts of the 1970s, Japan's utilities purchased large quantities of uranium, primarily via long-term contracts, some of which extend beyond 1995. Nuexco estimates that those commitments totaled approximately 400 million pounds U_3O_8, equivalent. Based on deliveries to date, approximately half of the total remains to be delivered over the next 10-12 years. The great majority of the material originates from suppliers in Canada, Australia and South Africa. Japanese utilities are also part owners of the Overseas Uranium Resources Development Company (OURD), which is a participant in the Akouta project in Niger. The utilities will receive more than two million pounds of U_3O_8 per year via OURD. In addition, Japan Australia Uranium Resources Development Company (JAURD) has invested in production by Energy Resources of Australia (ERA). Several Japanese utilities are part owners of JAURD and will receive approximately two million pounds U_3O_8 per year from Ranger production. Over the next ten years, those two arrangements account for approximately 20 percent of Japan's future delivery commitments from overseas suppliers.

Some rough approximations can lend perspective to the current supply-demand situation. Were Japan to achieve the government goal of 46,000 MWe installed capacity by 1992, annual uranium consumption would rise to approximately 15 million pounds U_3O_8. Nuexco's forecast of uranium consumption indicates an approximate annual average 10-12 million pounds U_3O_8 for the next ten years. Considering the current inventory of at least 35-45 million pounds U_3O_8 equivalent, in the form of U_3O_8 or natural UF_6, plus the 200 million pounds of U_3O_8 contracted for future delivery, it is apparent that Japan's utilities are covered well in excess of realistic needs. Furthermore, including enriched UF_6 inventory of 40-60 million pounds U_3O_8 equivalent would raise the current total to 75-105 million pounds. Other forms, such as UO_2, bring the total out-of-core inventory to 100-140 million pounds U_3O_8, equivalent.

Assuming a stable political and economic situation in the world, and specifically in the countries of Japan's principal uranium suppliers, one can conclude that Japan utilities have achieved secure, stable supply of uranium at least until the mid-1990s. Use of the recently announced "realistic" total capacity estimate of the utilities results in an even more conservative conclusion. Factors which could influence such simplified conclusions are:

1. The foregoing analysis refers to the nine private Japanese utilities, plus Japan Atomic Power Company (JAPC), collectively. JAPC is a separate entity, principally owned by the nine utilities, established to pioneer the design, construction and operation of first-of-a-kind reactors or new generations of existing designs. Of those ten companies, several of the medium-sized and smaller utilities could have unfilled uranium needs before the mid-1990s. Although they could probably make arrangements with other utilities to cover any short falls, it is possible that they might choose to contract for some additional supplies instead.

2. Underachieving the targeted goal for installed nuclear capacity would mean a positive balance of supply even beyond the mid-1990s. Conversely, if over the next few years progress on planned new projects matches the government's schedules, Japanese utilities may choose to make some additional purchases. However, delays are much more likely.

3. Reliance on overseas supply engenders even more caution in the already conservative policies of Japanese utilities. Indications of problems, such as those of political issues, labor disputes, or the formation of a cartel, threatening supply from one of Japan's principal uranium suppliers, could have a major impact on how the utilities view their current positive balance.

4. Japan has yet to commit to a definite policy for the stockpiling of uranium within Japan for protection against emergencies. The current natural uranium inventory of 35-45 million pounds U_3O_8 owned by individual utilities is not physically located within Japan, but is held in overseas locations. For several years, the topic of a national stockpile located in Japan has been discussed. Generally, a figure of two years' requirements in the form of U_3O_8 or enriched uranium has been mentioned. Such a stockpile could readily be achieved from Japan's already committed long-term supplies, but the definition of such a strategic stockpile policy is probably still some years away.

5. Recently there have been indications that the utilities might consider their inventory positions large enough to sell some of their surplus uranium. Aside from the psychological barrier associated with the sale of any resources, major obstacles are price and the need for government approvals. Under present long-term contracts, Japanese utilities renegotiate prices annually for deliveries one or two years in the future. Prices for 1983 and 1984 deliveries from major suppliers were recently established in the range of $33-36 per pound U_3O_8. Although these prices represent significant reductions from the previous several years, they are still considerably above possible selling prices in the current world market. It is very doubtful that Japanese utilities would consider selling at prices below those they are paying. Some pressure to sell also has recently surfaced in the national legislature; opposition parties have criticized the current administration's policy of permitting the utilities to hold such large inventories. To date those criticisms have been negated by arguments in favor of the need to assure security of resources. Any sales of inventories would reduce the supply surplus, but it is highly unlikely that the amounts would be large in comparison to the total inventory.

6. An alternative to the outright sale of uranium by the utilities has also received attention. Some suggestions have been made that perhaps Japanese utilities might lend material to overseas entities with commitments for return at a future date. This would appear to be a more likely possibility. The utilities have some domestic experience, having lent material to one another on occasion. An obstacle to any major overseas loan would be the providing of suitable guarantees for return of the material by the borrower, who would almost certainly have to be a major utility or a governmental agency. Any loans would alter the timing, but not the amount, of the cumulative supply surplus.

7. To date there have been no indications that Japanese utilities plan to seek any substantial renegotiations of their current long-term contracts with overseas suppliers to relieve any apparent excess of commitments. Their desire to maintain relations with established, reliable suppliers is an overriding concern compared to the possible advantages of change in the shorter term. In the course of several years, as the next decade's electricity generation plans become firmer, the possibility of some nominal renegotiation might increase. Nevertheless, it is reasonably certain that Japan's utilities will continue to value highly the stability of relationships.

8. Approximately twenty Japanese organizations are also participating in uranium exploration in various areas of the world. Most of those companies were organized by Japanese industrial and financial groups during the 1970s when optimism prevailed on targeted nuclear power generation and the world market uranium price was

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rising. Subsequently, after a number of token or unsuccessful efforts, most of those companies are intact. Historically, the most active Japanese organization has been the Power Reactor and Nuclear Fuel Development Corporation (PNC). PNC is a semi-government organization with primary funding from the Japanese government. PNC has maintained active exploration projects in Africa, Canada, Australia and the USA. Discoveries have been announced in Western Australia, British Columbia, and Mali. International Resources Corp., whose owners include Japan's three largest utilities, has located significant reserves in Niger. North American Resources, representing Mitsubishi interests in Japan, is exploring with Getty Oil in the USA. Idemitsu, a major Japanese oil company, has active joint venture exploration programs in Australia and Canada.

Development of reserves discovered to date, or likely to be discovered as a result of the above exploration, has been, or probably will be, delayed based on the current world uranium market. The economic development of some is not likely to materialize until beyond the mid-1990s and, consequently, will not significantly alter Japan's current indicated balance of supply.

Other Reactor Concepts

Japan is actively pursuing other reactor concepts as alternatives to its basic reliance on LWRs. Those alternatives are aimed at the use of slightly enriched uranium, mixed oxide fuels, and plutonium, thereby mitigating Japan's reliance on imported uranium.

Since 1977, PNC has operated a 50 MWth experimental Fast Breeder Reactor (FBR), subsequently upgraded to 75 MWth. Having demonstrated the basic FBR technology, PNC upgraded the reactor to 100 MWth in March 1983 and converted it for use as an irradiation reactor. A follow-up 300 MWe FBR for power generation has long been part of Japan's program. After many delays, that plant has passed initial safety reviews, and is now scheduled for 1994 completion.

A 165 MWe Advanced Thermal Reactor (ATR), also has been operated by PNC since 1979, with the objective of demonstrating its capability to serve as an alternative to Japan's standard LWRs. The ATR is a heavy-water-moderated, light-water-cooled reactor fueled with slightly enriched uranium, mixed oxide fuel, or both. Although the private utility sector raised a number of questions as to the need for such a reactor, a decision was reached in early 1983 to proceed with a 600 MWe ATR, essentially as a national project. Using PNC technology it is to be built for operation by 1994 by the Electric Power Development Corporation (EPDC). EPDC is a semi-government company, similar to TVA (the Tennessee Valley Authority) in the USA, which to date has developed a significant share of Japan's hydroelectric capacity.

In March, 1983 PNC also completed the world's first plutonium conversion facility. With a capacity of 10 Kg per day, such a plant will fabricate developmental mixed oxide (MOX) fuel for use in Japan's LWR and ATR. Plans are to supply demonstration fuel to representative BWR and PWR plants in Japan by the late 1980s. The same plans call for commercial use of MOX fuel in Japan's LWR plants by 1995.

The aforementioned reactor concepts and planning cannot be expected to effect any signficant reduction of future uranium requirements until early in the next centutury. Through the 1990s, Japan will still be reliant upon its LWR programs for nuclear generation, and on overseas uranium to supply them.

Enrichment and Reprocessing

From the beginning of Japan's LWR program for nuclear power generation, the nine private utilities and JAPC have relied almost exclusively upon the USDOE for enrichment services. In recent years, they have made some nominal commitments. to Eurodif. Collectively, the nine utilities and JAPC have contracted for more than an adequate quantity of enrichment services through 1987-1988. Enrichment needs beyond that time are not yet fully covered.

Although Japan's overall balance of enrichment services is more than adequate, the individual utilities' balances vary considerably. Several utilities have been actively exploiting the opportunities available in the secondary SWU market. During the past several years, Japanese utilities have accepted assignments of approximately 2 million SWU, covering needs in the 1983-1987 period.

The Japanese government, for some years via PNC, has had an active national program to develop a domestic capability to provide enrichment services. The program is based on developing Japan's own centrifuge technology. To date the program has achieved technical success. PNC initiated operation of a 70 to SWU per year pilot plant in March, 1982 which currently is functioning as predicted. However, the program has encountered delays in establishing a commercial-scale enrichment facility. One of the major problems appears to be the lack of the customary cooperation between the Japanese government and private industry to achieve a common goal.

The government is proposing that private industry accept the obligation to furnish enrichment services by application of PNC technology. The private sector appears cooperative but without the usual sense of urgency found in energy matters. The utilities also attach no particular urgency to the problem of enrichment services supply. Adequate and reliable supply from the USA and Europe, including that of the secondary SWU market, would appear to put Japanese buyers in a secure position for an indefinite time.

In a recent display of semi-displeasure, the government agencies publicly urged the utilities to form a new company to design, build and operate a 1500 ton SWU per year facility no later than 1989. Concurrently, the government urged the three LWR manufacturers (Toshiba, Hitachi and Mitsubishi Heavy Industries) to form a joint company capable of manufacturing the estimated 100,000 machines needed to build such a facility and expand it to 3000 ton SWU per year by the year 2000. Such an expanded facility would be able to supply approximately one-third of Japan's future enrichment needs. The government has also expressed frustration with delays in proceeding with PNC plans to build an enrichment demonstration plant of 200 tons SWU annual capacity. In an unusual circumstance, three communities are lobbying for the placement of such a facility in their areas. This contrasts to previous experiences, in which local governments have vigorously opposed other nuclear facilities. The proposed PNC demonstration plant would reach 100 tons SWU capacity by 1986 and full capacity by 1987.

Japan also is involved in several programs for the development of alternate enrichment technology. The government and utilities have participated in the UEGA (Uranium Enrichmen Group of Australia) evaluation aimed at the supply of Australia's uranium in the form of enriched material. Should the Australian program materialize, Japanese interests would probably encounter substantial pressure to make a significant financial investment to maintain relations with one of the countries representing a major source of their needed uranium. This would be in addition to enrichment services already contracted from the USA and Europe, as well as the domestic program which will almost certainly proceed. Another enrichment technology is being investigated in the private sector by Asahi Chemical Industries (ACI). With some government funding, ACI has successfully enriched uranium on a pilot plant scale using ion exchange technology. Currently, ACI is installing a larger size facility for further demonstration tests. Details available on development work are minimal, but public announcements to date have been optimistic. Success in commercialization by ACI would mean that the ion exchange technology would be competing for development funds against centrifuge technology.

Japan's national program for a high degree of self-sufficiency in the nuclear fuel cycle includes the capability for domestic reprocessing of nuclear fuel. After considerable delay PNC started operation of a 0.7 ton per day demonstration plant in 1977. Basic technology was introduced from France. Although successful in verifying process viability, the plant has been plagued by considerable hardware corrosion problems. Although the facility has successfully reprocessed several batches of limited quantities of domestic utilities' spent LWR fuel, problems with dissolver equipment forced it to shut down in February 1983. The plant will probably be out of operation for two years and, when it does restart, its capacity might be derated.

In 1979, Japan's basic nuclear laws were changed to permit private industry to operate reprocessing facilities, until then restricted to government operation. Subsequently Japan Nuclear Fuel Services (JNFS) a private sector company, was established with principal ownership by the utilities and a number of other nuclear industry particpants. Initial plans called for three plants of 5 short tons uranium per day capacity to be made operational sequentially within the 1990s. Those plans have been revised substantially. Currently, JNFS is planning a single 1000 ton per year facility scheduled for operation in the early 1990s. In the interim, the utilities are faced with an ever increasing quantity of spent fuel from their LWR program.

To date the Japanese utilities have contracted for significant quantities of reprocessing by England and France. However, LWR spent fuel is accumulating in excess of those contracts. The excess is being accumulated at plant sites by means of re-racking of fuel storage pools for higher density storage. Planning of the new JNFS facility includes accelerating construction of the receiving and storage portion of the plant to provide additional interim storage.

Presently, Japanese utilities' planning for reprocessing faces the highest degree of uncertainty in Japan's effort to achieve adequate coverage of the entire fuel cycle. Still unresolved is the ultimate storage of high level wastes, the return of which they are obligated to accept after overseas reprocessing, as well as those from the planned JNFS plant. Such uncertainties in turn leave open to question the ultimate value of planned advance reactors such as the ATR and FBR, and the expected reduction of future uranium requirements.

Summary

1. In Report 175 of March 1983, Nuexco forecast 33,570 MWe of installed nuclear generating capacity in Japan by March 1991. Since then two additional plants have received their construction licenses, and one has received EPRDCC approval to apply for its license. However, recently it was announced that the commercial operation dates for all three would be delayed six months. One plant already under construction was also delayed six months in the interim. Those changes are reflected in Table 4.

If all plants were completed on the schedules indicated in Table 4, the total would be 21,357 MWe. Added to the current 17177 MWe in operation, the result would be an approximate total of 38,500 MWe capacity by the end of 1991. That total corresponds with announcements by the Japanese utilities. However, Nuexco forecasts call for further delays during the construction and licensing of these plants, resulting in a total capacity of approximately 33,500 MWe in operation by 1991.

2. Nuexco's 1991 forecast of 33,500 MWe equates to annual consumption of approximately 10-12 million pounds U_3O_8 from 1983 to 1991. That level of consumption is 20-33 percent less than the approximately 15 million pounds per year required to meet a goal of 46,000 MWe by 1992. That conclusion lends further support to the statement that, collectively, Japan's utilities are adequately supplied into the mid-1990s.

3. In the current market there appears to be little or no incentive for the Japanese utilities to commit to additional quantities of uranium by extension of current contracts or by the execution of new, long-term contracts. Any procurement activity for the next several years will potentially be limited to:

a. Nominal purchases to compensate for unforeseen interruptions of deliveries from current long-term suppliers;

b. Some additional intermediate-term purchases by several utilities with a somewhat less positive inventory balance than the group average;

c. Purchases for a national stockpile, should such a concept materialize. However, Nuexco feels any decision is several years away and that the group's requirements can be filled from current long-term contracts of individual utilities.

4. Conversely, it now appears the utilities can more realistically forecast plant additions and uranium needs for the next ten years. Assuming no events which could be interpreted as threatening stable supply, it is conceivable that some utilities with longer than average supply contracts may take action within several years to alleviate that situation. In order of descending probability, those are:

a. Loan of near-term deliveries for future repayment;

b. Transfer of deliveries to a national stockpile;

c. At least some renegotiation to reduce annual delivery commitments of current long-term contracts;

d. Sale of nominal amounts of uranium, in particular if prices recover significantly above current levels.

5. Some Japanese utilities will be active in further commitments for enrichment services. Nuexco forecasts call for the domestic enrichment plan to suffer further delays. In that event, the utilities will supply their needs for enrichment service between new overseas commitments, and continuing use of the secondary SWU market. The longer-term meaning of the USDOE's new Facilities Requirements (FR) type contracts still is not apparent to the utilities. Attractive prices offered by Eurodif recently perhaps favor additional commitment to Europe.

6. Japan's nuclear generation will be LWR-based, at least until the year 2000. The current alternate reactor concepts and reprocessing will not affect basic uranium needs until the post-2000 period.

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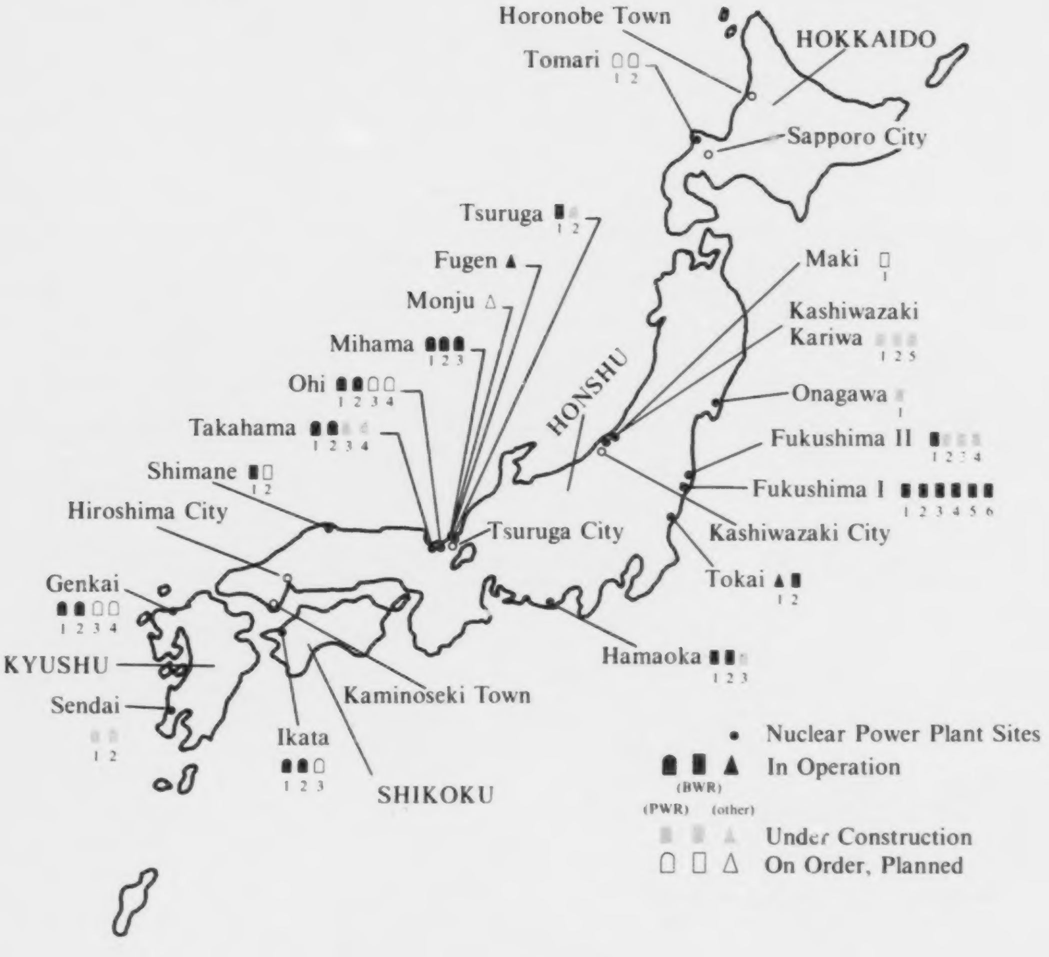
Horonobe Town
HOKKAIDO
Tomari 1 2
Sapporo City
Tsuruga 1 2
Fugen
Monju
Mihama 1 2 3
Ohi 1 2 3 4
Takahama 1 2 3 4
Shimane 1 2
Hiroshima City
Genkai 1 2 3 4
KYUSHU
Sendai 1 2
Ikata 1 2 3
SHIKOKU
Kaminoseki Town
HONSHU
Tsuruga City
Maki 1
Kashiwazaki Kariwa 1 2 5
Onagawa 1
Fukushima II 1 2 3 4
Fukushima I 1 2 3 4 5 6
Kashiwazaki City
Tokai 1 2
Hamaoka 1 2 3
Nuclear Power Plant Sites
In Operation
(BWR)
(PWR)
(other)
Under Construction
On Order, Planned

Figure 1

Distribution of Nuclear Power Plants in Japan

(Does not include units planned, but not yet submitted to EPRDCC, listed in Tables)

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Table 3

OPERATING NUCLEAR POWER PLANTS IN JAPAN

Power Plant	Utility	Reactor Type	Capacity (MWe)	Start of Operation
Tokai-1	JAPC	GCR	166	Jul. '66
Tokai-2	JAPC	BWR	1,100	Nov. '78
Tsuruga	JAPC	BWR	357	Mar. '70
Fukushima I-1	Tokyo E.P. Co.	BWR	460	Mar. '71
Fukushima I-2	Tokyo E.P. Co.	BWR	784	Jul. '74
Fukushima I-3	Tokyo E.P. Co.	BWR	784	Mar. '76
Fukushima I-4	Tokyo E.P. Co.	BWR	784	Oct. '78
Fukushima I-5	Tokyo E.P. Co.	BWR	784	Apr. '78
Fukushima I-6	Tokyo E.P. Co.	BWR	1,100	Oct. '79
Fukushima II-1	Tokyo E.P. Co.	BWR	1,100	Apr. '82
Hamaoka-1	Chubu E.P. Co.	BWR	540	Mar. '76
Hamaoka-2	Chubu E.P. Co.	BWR	840	Nov. '78
Mihama-1	Kansai E.P. Co.	PWR	340	Nov. '70
Mihama-2	Kansai E.P. Co.	PWR	500	Jul. '72
Mihama-3	Kansai E.P. Co.	PWR	826	Dec. '76
Takahama-1	Kansai E.P. Co.	PWR	826	Nov. '74
Takahama-2	Kansai E.P. Co.	PWR	826	Nov. '75
Ohi-1	Kansai E.P. Co.	PWR	1,175	Mar. '79
Ohi-2	Kansai E.P. Co.	PWR	1,175	Dec. '79
Shimane-1	Chugoku E.P. Co.	BWR	460	Mar. '74
Ikata-1	Shikoku E.P. Co.	PWR	566	Sept. '77
Ikata-2	Shikoku E.P. Co.	PWR	566	Mar. '82
Genkai-1	Kyushu E.P. Co.	PWR	559	Oct. '75
Genkai-2	Kyushu E.P. Co.	PWR	559	Mar. '81
TOTAL			17,177	

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FOCUS

Table 4

STATUS OF SCHEDULED NUCLEAR POWER PLANTS IN JAPAN

Power Plant	Utility	Reactor Type		Capacity (MWe)	Start of Operation
Under Construction					
Onagawa-1	Tohoku E.P. Co.	BWR		524	June 1984
Fukushima II-2	Tokyo E.P. Co.	BWR		1,100	Jan. 1984
Fukushima II-3	Tokyo E.P. Co.	BWR		1,100	July 1985
Fukushima II-4	Tokyo E.P. Co.	BWR		1,100	Sept. 1987
Kashiwazaki-1	Tokyo E.P. Co.	BWR		1,100	Oct. 1985
Takahama-3	Kansai E.P. Co.	PWR		870	Aug. 1984
Takahama-4	Kansai E.P. Co.	PWR		870	Feb. 1985
Sendai-1	Kyushu E.P. Co.	PWR		890	July 1984
Sendai-2	Kyushu E.P. Co.	PWR		890	March 1986
Tsuruga-2	JAPC	PWR		1,160	June 1987
Hamaoka-3	Chubu E.P. Co.	BWR		1,100	Sept. 1986
Kashiwazaki-2	Tokyo E.P. Co.	BWR		1,100	Oct. 1989
Kashiwazaki-5	Tokyo E.P. Co.	BWR		1,100	April 1990
			Subtotal	12,904	
Under Licensing (Approved by EPRDCC)					
Kyowa Tomari-1	Hokkaido E.P. Co.	PWR		579	Dec. 1988
Kyowa Tomari-2	Hokkaido E.P. Co.	PWR		579	Dec. 1990
Shimane-2	Chugoku E.P. Co.	BWR		820	Sept. 1988
Genkai-3	Kyushu E.P. Co.	PWR		1,180	Oct. 1990
Ikata-3	Shikoku E.P. Co.	PWR		890	March 1990
			Subtotal	4,048	
Under EPRDCC Review					
Ohi-3	Kansai E.P. Co.	PWR		1,200	June 1990
Ohi-4	Kansai E.P. Co.	PWR		1,200	Feb. 1991
Genkai-4	Kyushu E.P. Co.	PWR		1,180	Oct. 1991
Maki	Tohoku E.P. Co.	BWR		825	Dec. 1991
			Subtotal	4,405	
			TOTAL ALL CATEGORIES	21,357	

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Table 5

PLANNED NUCLEAR PLANTS IN JAPAN (NOT YET SUBMITTED TO EPRDCC)

Power Plant	Utility	Reactor Type		Capacity (MWe)	Start of Operation
Higashi-Dori-1	Tohoku E.P. Co.	BWR		1,180	March 1993
Onagawa-2	Tohoku E.P. Co.	BWR		824	Sept. 1992
Namie-Odaka	Tohoku E.P. Co.	BWR		824	Sept. 1994
Kashiwazaki-3	Tokyo E.P. Co.	BWR		1,100	July 1992
Kashiwazaki-4	Tokyo E.P. Co.	BWR		1,100	July 1993
N-1	Chubu E.P. Co.	BWR		1,100	Sept. 1992
Noto	Hokuriku E.P. Co.	BWR		540	March 1992
Toyokita-1	Chugoku E.P. Co.	BWR		1,100	Nov. 1993
Toyokita-2	Chugoku E.P. Co.	BWR		1,100	Nov. 1995
			TOTAL	8,868	

Table 6

ESTIMATED UNIT COSTS OF ELECTRICITY GENERATION IN JAPAN

Source	Cost Yen per KWH
nuclear	12
coal	15
LNG	19
Hydro	20
oil	20

Source: Japan Agency of Natural Resources and Energy

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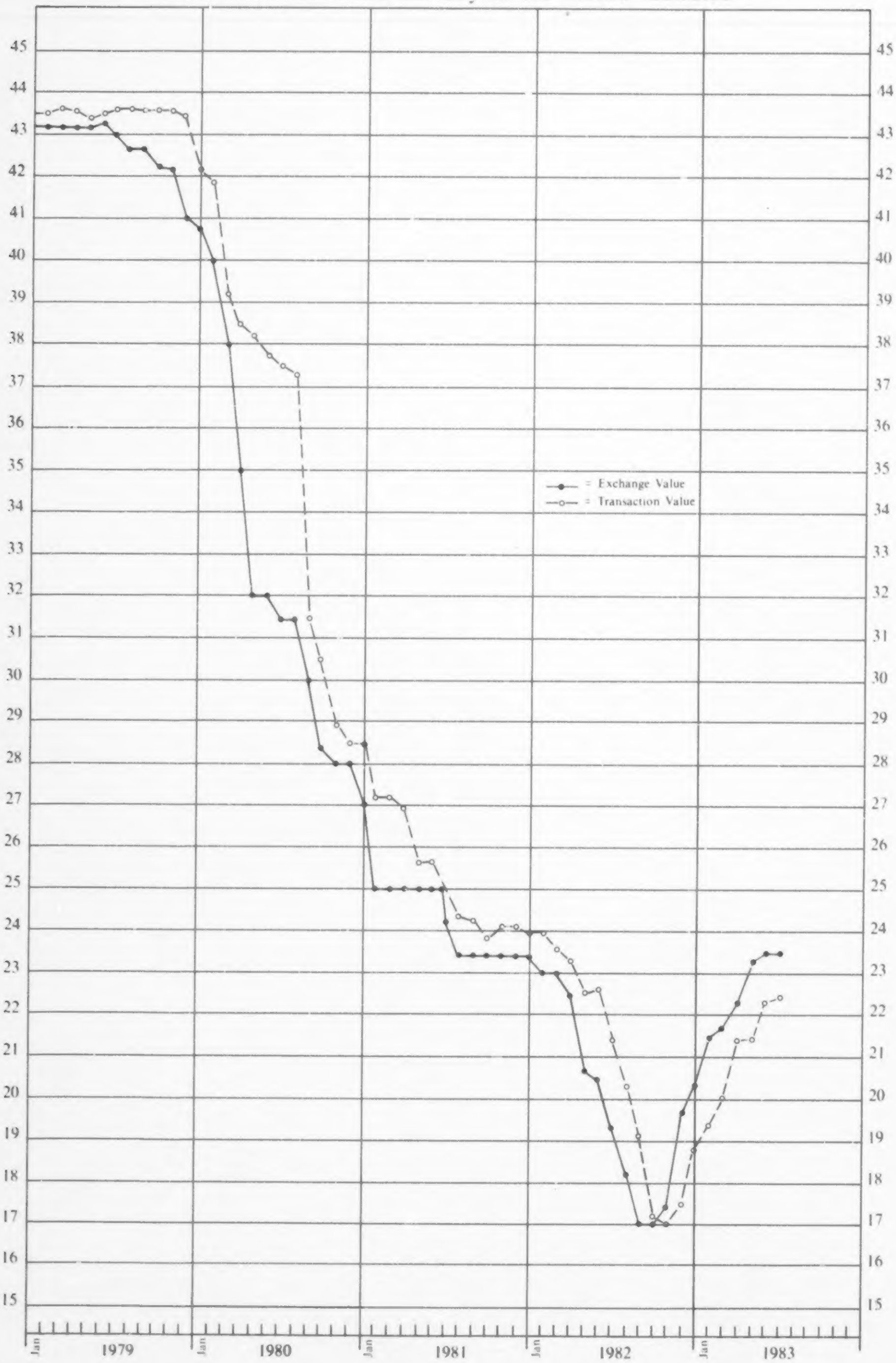
HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1979

Determined as of the last day of the month indicated



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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	**23.50**						

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	**22.45**						

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	**1.20**						

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GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates (Year 1976 = 100.0)[2]
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.00
Annual Avg. 1981	355.3	237.34
Annual Avg. 1982	367.9	—
Jan 1982	354.9	169.3[2]
Feb 1982	356.7	171.1[2]
Mar 1982	360.3	171.4[2]
Apr 1982	367.7	171.4[2]
May 1982	367.6	171.9[2]
Jun 1982	367.8R	173.2[2]
Jul 1982	369.7R	177.2[2]
Aug 1982	372.1R	178.1[2]
Sep 1982	374.6R	178.2[2]
Oct 1982	377.8R	178.3[2]
Nov 1982	375.1R	178.4[2]
Dec 1982	374.3R	179.4[2]
Jan 1983	386.2R	179.1[2]
Feb 1983	388.0R	179.0[2]
Mar 1983	397.3P	178.9[2]

P = Preliminary   R = Revised since last month

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[1] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.

[2] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0), Table 8. Figures are being converted to an Index number. As the data are converted, the new index numbers will be inserted. Figures for the latest fourteen months shown are subject to revision.

[3] Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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CANADA

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[4] [5]		
		Metal Mining, including Milling (SIC 050-099)[3]	Primary Metal Industries, non-ferrous (SIC 296-298)	Chemicals and Chemical Products (SIC 370-379)
Annual Avg. 1979	217.9	9.66	7.35	7.67
Annual Avg. 1980	247.2	10.80	8.05	8.50
Annual Avg. 1981	288.8P	12.23	9.03	9.53
Mar 1982	284.8	13.74	9.62	10.35
Apr 1982	287.7	13.81	9.79	10.48
May 1982	288.8	13.86	9.88	10.62
Jun 1982	289.7	13.83	9.92	10.69
Jul 1982	290.3	14.02	10.05	10.73
Aug 1982	290.3	14.23	10.03	10.80
Sep 1982	292.4	14.01	10.18	10.73
Oct 1982	292.1	13.89	10.18	10.86
Nov 1982	291.3	14.28	10.43	10.90
Dec 1982	292.3	14.32	10.55	11.06
Jan 1983	292.7	14.35R	10.72	11.06
Feb 1983	293.5R	14.31R	10.79R	11.07R
Mar 1983	295.2	14.65P	10.95P	11.21P
Apr 1983	297.0R	—	—	—
May 1983	298.5			

P = Preliminary R = Revised since last month

[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.
[2] Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.
[3] The wage earner series in Nuexco reports prior to March 1983 was Metals (SIC 050-059).
[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.
[5] Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

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GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Producer[5] Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[7]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[7]
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3,6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3,6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3,6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Annual Avg. 1981	41.89	206.5	218.3	728,506	2,820,505
Annual Avg. 1982	47.25	233.5	248.7	707,552	3,246,071
Dec 1981	44.52	216.3	230.4	709,612	257,655
Jan 1982	—	217.6	233.1	700,375	257,173
Feb 1982	—	220.2	236.8	705,992	250,191
Mar 1982	45.49	225.2	237.4	725,700	262,210
Apr 1982	—	228.9	241.9	707,502	252,562
May 1982	—	230.3	244.8	715,162	258,770
Jun 1982	45.77	232.1	246.7	707,552	261,361
Jul 1982	—	234.1	249.4	702,141	283,248
Aug 1982	—	236.8	253.4	705,562	276,730
Sep 1982	48.04	241.0	255.0	704,344	282,782
Oct 1982	—	243.9	260.1	701,316	285,328
Nov 1982	—	245.4	262.5	707,966	287,699
Dec 1982	49.62	246.2	263.0	683,982	288,019
Jan 1983	—	249.0	264.9	688,030	289,075
Feb 1983	—	253.1	267.4	697,089	281,413
Mar 1983	50.35	255.9	269.1	672,891	282,476
Apr 1983	—	257.8	270.9	—	—
May 1983	—	259.7	—	—	—

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[1] Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly. The tonnage-weight index of average working costs per metric ton of gold ore milled for 1983 is as follows. (Base: March quarter 1982 = 100). See Nuexco report #178 page 24 for the tonnage-weighted index for 1982. Description and calculation of the index is on page 16 of Nuexco report #178.

1983: January-March 111.2

[2] Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."

[3] Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.

[4] April 1970 = 100.00.

[5] Previously known as the WHOLESALE PRICE INDEX, now the PRODUCER PRICE INDEX. The computation remains the same.

[6] Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

[7] Bulletin of Statistics, Department of Statistics, Pretoria.

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UNITED STATES

	Producer Price Index—Industrial Commodities (1967 = 100)[1]	Producer Price Index—All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.75	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	115.08	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	125.79	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	132.34	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	140.05	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
Annual Avg. 1981	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
Annual Avg. 1982	312.3	299.3	289.1	207.15	12.33R	12.94R	9.96R	8.21R
May 1982	309.6	298.6	287.1	—	12.29R	12.74R	9.81R	8.10R
Jun 1982	310.6	299.3	290.6	205.98	12.28R	12.95R	9.94R	8.14R
Jul 1982	312.8	300.4	292.2	—	12.23	12.94R	10.00R	8.23R
Aug 1982	313.2	300.2	292.8	—	12.29	13.01R	10.01R	8.30R
Sep 1982	312.7	299.3	293.3	208.51	12.53	13.51R	10.19R	8.37R
Oct 1982	314.3	299.8	294.1	—	12.51R	13.26R	10.22R	8.41R
Nov 1982	315.0	300.3	293.6	—	12.53R	13.22R	10.26R	8.45R
Dec 1982	315.2	300.7	292.4	210.42	12.53R	13.05R	10.32R	8.51R
Jan 1983	313.9R	299.9R	293.1	—	12.63R	13.33R	10.34R	8.53R
Feb 1983	314.4P	301.2P	293.2	—	12.66R	13.29R	10.41R	8.56R
Mar 1983	313.4P	300.5P	293.4	213.26	12.48R	13.35R	10.39R	8.60R
Apr 1983	312.6P	300.8P	295.5	—	12.67	13.28	10.43R	8.60R
May 1983	313.8P	301.7P	297.1	—	—	—	10.52P	8.59P

P = Preliminary R = Revised since last month

[1] US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2] US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3] US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4] US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5] Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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NUEXCO

REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
P.O. Box 70
7 Cliff Street
Milson's Point
NSW 2061, Australia
Telephone: (61-2) 929-6999
Telex: 73303 (ORATOM AA)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: 431-6031, 431-6025
Telex: 242-5060 (JATECH J)

SOUTH AFRICA

Chris I. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 8-9878

TAIWAN

Edward Bee
Bee & Liang Company, Limited*
8-G Fl. Jen AE Mansion
NOK 37 Jen AI Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: (886-2) 721-2117
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, North Carolina 28327
Telephone: (919) 949-3622

Joe L. Hixon*
302 Lombardy
Sugarland, Texas 77478
Telephone: (713) 494-3802

W. Hardy Prentice*
11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: (216) 631-2350

SPECIAL CONSULTANTS

Claus Thiesen
Kirkland, Washington

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

*Independent contractors representing Nuexco

8/17/83
B6800-18

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AUGUST 1983 NUMBER 180

Monthly Report on the Nuclear Fuel Market

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)
TWX: 910-373-1760 (NUEXCO MNPK)

J. Robert Wolcott
Chairman

George White, Jr.
President

Wayne D. Fowler
Senior Vice President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Thomas A. Boyden, V.P.

R. Wesley Miller, V.P.

Christian C. Guitton

Kim M. Peyton

Donald W. Radcliffe

Judith L. Sellers

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan
Senior Vice President

Kathryn K. Bowen

W. Scott Hickman

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Kenneth R. McCue, V.P.

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 500
Seven Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210
Telex: 4611142 (NUEX ATL)

M. Jerry Reaves, V.P.

(See inside back cover for list of Representatives and Consultants)

EXECUTIVE SUMMARY
REPORT 180

Exchange Value $24.00, Up $0.50	The **Exchange Value** as of July 31, 1983 is **$24.00** per pound U_3O_8, up 50 cents from last month. Five uranium sales transactions are reported, involving approximately one million pounds U_3O_8 *equivalent*. One transaction involved enriched UF_6, three involved U_3O_8, and the fifth involved natural UF_6.
Supply-Demand Ratio Increased slightly to 2.8:1	**Active** spot and near-term **uranium supply** amounts to 7.1 million pounds U_3O_8, *equivalent*, up 1.1 million pounds from last month. **Active** spot and near-term **uranium demand** rose 13%, to **2.6** million pounds U_3O_8 equivalent. Therefore, the spot and near-term **supply-demand ratio** rose slightly, to **2.8.**
Transaction Value Rose $1.05, to $23.50	The **Transaction Value** as of July 31, 1983, is **$23.50** per pound U_3O_8. It includes 19 transaction involving a total of 2.6 million pounds equivalent U_3O_8 and covers a period of five months.
Conversion Value Declined to $1.10	The **Conversion Value** as of July 31, 1983 is **$1.10** per pound U as UF_6, down 10 cents since last month. No secondary market conversion transactions are reported. Active supply remains approximately four times active demand.
Loan Use Charge Rate Steady at 6%	The **Loan Use Charge Rate** as of July 31, 1983 is **6 percent** per annum. No uranium loan transactions are reported.
SWU Value: FY 84 $95, Down $8	As of July 31, 1983 the **SWU Value for FY 84** is **$95 per SWU**, down $8 since last month, reflecting prices being offered by sellers of large quantities of Eurodif-origin SWUs in response to USDOE's offer to reduce the SWU price under requirements contracts having 3.5-year termination provisions to the AFC price, currently $11.20 lower than the requirements contract price. Spot and near-term demand for secondary market enrichment services amounts to 630 thousand SWUs. Similarly, active supply of spot and near-term enrichment services in the secondary market amounts to 540 thousand SWUs.
SWU Transactions	This issue reports one secondary market sale of enrichment services, involving the sale of 200 thousand Eurodif-origin SWUs from a European entity to a US utility.
Australia	Denison has entered into an agreement whereby Aboriginal traditional owners affected by Koongarra development would acquire a 25 percent equity position in the project.
Europe	Yugoslavia's domestic austerity program and its efforts to halt the currency outflow may increase Western bankers' confidence enough to improve the nation's ability to finance various projects, including the procurement of uranium.
Japan	Review of Japan's recent history with respect to price settlements under long-term contracts suggests that prices for 1983 deliveries by Australia's Queensland Mines will be settled near $35.50.
Focus: Spain	Socialist government actions likely to increase Spain's inventory of uranium (currently more than 10 million pounds U_3O_8 equivalent) and enrichment (currently more than 6 million SWUs) unless ENUSA sells large quantities of natural uranium and SWUs on the secondary markets.
South Africa	Second quarter production by Chamber of Mines members came to 3.9 million pounds U_3O_8, 5.7 percent higher than the previous quarter.
United States	Some successful achievements of the US nuclear power industry are reviewed (Susquehana 1, McGuire 2, St. Lucie 2, Palo Verde project).

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3000 SAND HILL ROAD MENLO PARK, CALIFORNIA 94025
TELEPHONE: (415) 854-1510 TWX: 910-373-1760 (NUEXCO MNPK) TELEX: 470674 (NUEXCO UI)

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NUEXCO REPORT 180 FIGURES OF THE MONTH (July 31, 1983)	This Month (Report 180)	Last Month (Report 179)	12 Months Ago (Report 168)
Exchange Value[1]	24.00	23.50	18.25
Transaction Value[1]	23.50	22.45	20.30
Conversion Value[2]	1.10	1.20	1.00
Loan Use Charge Rate[3]	6%	6%	6%
Near-Term Uranium Supply[4]	7.1	6.0	2.6
Near-Term Uranium Demand[5]	2.6	2.3	1.0
Near-Term Supply-Demand Ratio	2.8	2.6	2.6
Recent Uranium Sales:			
Number of Transactions[6]	5	4	6
Quantity of Material[7]	0.8-1.5	1.3-3.7	1.9-3.9
Nuexco SWU Value:			
FY 84	95	103	—
USDOE SWU Prices:			
AFC	138.65	138.65	130.75
Requirements	149.85	149.85	141.15
Market Value of Enriched UF_6[9] [10]:			
2.5 w/o U_{235}	598.47	619.44	—
3.0 w/o U_{235}	764.27	792.80	—
3.5 w/o U_{235}	932.90	969.24	—
4.0 w/o U_{235}	1,103.64	1,147.96	—

---

[1] US $ per pound U_3O_8 equivalent

[2] US $ per pound U as UF_6

[3] Per annum

[4] Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds U_3O_8)

[5] Active inquiries to purchase, for delivery within 12 months after contract signing (millions of pounds U_3O_8).

[6] Uranium sales only; does not include loans, conversion, or SWU transactions.

[7] Millions of pounds U_3O_8, equivalent.

[8] US $ per SWU.

[9] Calculated using the Nuexco Exchange Value, Conversion Value, and 0.20 percent tails assay. Calculations before 2/28/83 used the USDOE price for AFC SWUs. As of 2/28/83, calculations use the Nuexco SWU Value for the relevant fiscal year (currently FY 84).

[10] US $ per KgU as UF_6.

INDEX TO LAST MONTH'S REPORT (179)

Topic		Page
Analysis & Commentary	US reactor cancellations, past and future	15
Australia	Confusion in Labor Party's policies	13
	Roxby Downs EIS gets state approval	13
Japan	FOCUS: Uranium Demand and Supply in Japan	22
Italy	Siting problems solved, but overall direction lacking	13
United States	St. Lucie 2 to get full power OL	14
	WPPSS financial problems continue	14
Uranium Marketing and Prices	*Enriched Uranium and SWUs:* Secondary market pricing in June 1983	1
	Natural Uranium and Secondary Market Conversion Services Pricing in June 1983	1

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MONTHLY REPORT ON THE URANIUM MARKET

August 1983 No. 180

R. WESLEY MILLER, *EDITOR*

PRICING

Natural Uranium and Conversion 1
Enriched Uranium and SWUs 1

CURRENT MARKET DATA

Exchange Value and Transaction Value 3
Conversion Value and Loan Use Charge Rate 4
SWU Values 5
Prices Expressed in Selected Currencies 6
Transaction Summary 8
Supply and Demand Tables 9

RECENT DEVELOPMENTS

Australia 14
Europe 14
Japan 15
South Africa 15
United States 16

FOCUS

Uranium Demand and Supply in Spain 17

RAW MATERIALS

Greenland: The Kvankefjeld Uranium Deposit 23

HISTORICAL MARKET DATA

Graph of Exchange Value and Transaction Value 29
Historical Exchange Value, Transaction Value and Conversion Value 30

GOVERNMENT STATISTICS

Australia 31
Canada 32
South Africa 33
United States 34

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FOREWORD

Nuexco will have a suite during the Uranium Institute's Eighth Annual Symposium in London, England. The suite will be located at the Savoy Hotel, August 24-26. We look forward to seeing you in London.

* * *

As of August 1, 1983, Nuexco began transmitting monthly by telex *to all Category I subscribers* a summary of the most-requested current market data published in each month's Report. Please contact Wendy Boyden or Kathie Kuziel in our Menlo Park office to resolve any problems.

NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of July 31, 1983 is **$24.00** per pound U_3O_8, up $0.50 from last month. The *Current Market Data* section of this Report lists five uranium sales transactions, involving approximately 1.0 million pounds U_3O_8, *equivalent*. Those sales reflected the ongoing shift of the spot and near-term markets toward an integrated market involving natural UF_6, enriched UF_6 and enrichment services, as well as U_3O_8. One transaction involved enriched UF_6, three involved U_3O_8, and the fifth involved natural UF_6.

Active spot and near-term uranium supply (U_3O_8 or natural UF_6 offered at competitive prices, terms, and other conditions) amounts to **7.1 million** pounds U_3O_8 equivalent, up 1.1 million pounds from last month. **Active spot and near-term uranium demand** rose to **2.6 million** pounds U_3O_8 equivalent, up from 2.3 million as of June 30. The spot and near-term **supply-demand ratio** was **2.8:1**, slightly higher than last month's level of 2.6.

The **Transaction Value** as of July 31, 1983, is $23.50 per pound U_3O_8, equivalent, an increase of $1.05 since last month. The current Transaction Value includes 19 transactions involving a total of 2.6 million pounds U_3O_8 equivalent, and covers a period of five months.

* * *

The **Conversion Value** as of July 31, 1983 is **$1.10** per pound U as UF_6, down from last month. No secondary market conversion transactions are reported this month.

Active supply of secondary market conversion services (active inquiries to sell secondary market conversion services for delivery within the next *three* years) totals **7.0** million pounds U. **Active demand** for secondary market conversion services amounts to **1.8** million pounds U. Active supply remains approximately four times active demand.

* * *

The **Loan Use Charge Rate** remained at six percent per annum. Nuexco is aware of at least three lenders holding a total of more than three million pounds available for loan as U_3O_8 at 6 percent per annum, but there are few potential borrowers. No loan transactions are reported this month.

* * *

During July, the Exchange Value drifted upward slightly, but on a generally low level of market activity. The market as of July 31 was characterized by the contrast between large-volume sellers of natural UF_6 at prices below the current Exchange Value on one hand and, on the other, discretionary buyers for relatively small quantities of US-origin U_3O_8. Finding it difficult if not impossible to deconvert their material, UF_6 sellers were not directly competitive with sellers of concentrates. Other factors relevant to the determination of this month's Exchange Value were:

1. Transactions took place at or near the $24.00 level. One large sale of UF_6 took place in which the U_3O_8 component was priced at the current Exchange Value, but other considerations played a part in the transaction. One small sale of U_3O_8 took place at the current Exchange Value. Nuexco knows of at least one buyer willing to pay the current Exchange Value *for concentrates*, but not for the U_3O_8 component of UF_6.
2. Buyers were generally able to elicit ample interest on the part of sellers, merely by making known their willingness to entertain offers.
3. A great deal of the supply and demand in the market dealt with UF_6. Supply of concentrates amounted to 2.6 million pounds U_3O_8 and demand for concentrates amounted to 1.6 million pounds U_3O_8. However, only three sellers were offering concentrates in large enough quantities to satisfy the smallest of the four items of demand for concentrates. Thus, although overall concentrate supply still out-weighed overall concentrate demand, the individual buyers and sellers were somewhat mismatched.
4. Some discretionary buying activity took place, stimulated by some buyers' relatively low cost of money combined with expectations of rising prices.
5. Finally, July saw the continuation of a trend that has been evident for several months, namely a growing consensus that prices "ought to be higher." There seems to be little buyer resistance to the gradual increases which have occurred since the low point reached in the fall of 1982. Thus, prices appear to be drifting upward, as opposed to being driven upward by aggressive buying.

ENRICHED URANIUM AND SWUS

As of July 31, 1983 the SWU value for FY 1984 is $95 per SWU, down $8 from last month, once again reflecting the prices offered by sellers of large quantities of Eurodif-origin SWUs. The drop of $8 since last month reflects their response to USDOE's offer to reduce the SWU price under requirements contracts having 3.5-year termina-

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PRICING

tion provisions to the AFC price, currently $11.20 lower than the requirements contract price.

As of July 31, spot and near-term demand for secondary market enrichment services amounted to 630 thousand SWUs. Active supply of spot and near-term enrichment services in the secondary market amounted to 540 thousand SWUs. The *Current Market Data* section reports one transaction for secondary market enrichment services, involving the sale of 200 thousand Eurodif-origin SWUs from a European entity to a US utility.

* * *

Activity in the secondary market for enrichment services was dominated by USDOE's frantic efforts to maintain market share. Having discovered that some DOE customers (holders of requirements contracts containing 3.5-year termination provisions) could save substantial amounts of money by partially terminating their DOE contracts, paying the DOE termination charges (10 to 25 percent, as opposed to 40 percent for contracts having 5-year termination provisions), and replacing those SWUs on the secondary market, DOE responded with the Interim Sales Contract (ISC) to induce them to forego the secondary market opportunity.

At a time when $1.8 billion already had been spent on the new Portsmouth centrifuge plant, DOE had lost about $1 billion worth of business in SWU contract terminations, and $470 million were still at risk over the next three years under contracts with nine customers. In the first of several tactics planned "to try and rationalize the market", DOE needed to offer prices which, given the current termination charges, would eliminate any significant incentive for a DOE customer to turn to the secondary market. Following negotiations with Philadelphia Electric Company and after some hesitations caused by legal issues, DOE offered the ISC to all holders of requirements contracts having 3.5-year termination provisions. Under the ISC, a DOE customer would waive the right to terminate the contract and would commit to take all enrichment requirements from DOE. In return, DOE would reduce that customer's SWU price for FY83-FY85 (currently $149.85) to the fixed-commitment contract price (currently $138.65) and increase their current 30-day payment term to 60 days.

The secondary market price for SWUs dropped by $8 as a direct consequence of DOE's offering of the ISC. With a 25 percent termination charge, currently $37.46, and a new secondary market price of X, a utility willing to terminate a 3.5-year requirements contract would end up paying $(37.46 + X) per SWU. Under the terms of the ISC, the same customer would pay only $138.65 per SWU (current fixed-commitment price). It is Nuexco's observation that, to give any utility some incentive to consider the secondary market, a profit of at least $6-7 should be possible. A mathematical translation of this statement is: (138.65) - (37.46 + X) must be greater than or equal to $6 to $7, or X must be less than or equal to 138.65 - 37.46 - (6 to $7) = $94.19 to $95.19. Thus, any sellers of secondary market SWUs asking for more than $94-95 are not apt to be very successful. Hence, the SWU Value of $95 for FY84.

The effect of the DOE's offer of the ISC has been to reduce the break-even price from $112.39 to $101.19, although no termination for FY 83-85 SWUs will be allowed if the affected DOE customers decide to accept the ISC. Transactions unaffected by the ISC are all those that do not depend on a partial contract termination by a holder of a DOE requirements contract having 3.5-year termination provisions. Those include:

1. DOE-origin/DOE-origin
2. Eurodif-origin/Eurodif-origin
3. Sales of DOE-origin SWUs to non-DOE customers.

Decisions by DOE customers holding requirements contracts having 3.5-year termination provisions to accept or decline the ISC will be based on several factors:

1. By accepting the ISC, a customer would obtain a guaranteed saving ($11.20 per SWU for FY83; indeterminate for FY84 and FY85).
2. In exchange, that same customer would surender the opportunity to obtain an even greater saving on the secondary market. Given the tremendous excess of secondary market SWUs, the course of action likely to yield the greatest benefit to shareholders and ratepayers is far from certain.
3. To the extent that a customer accepts the ISC in order to support DOE as its primary supplier of enrichment, that customer would be paying $6-$7 per SWU more than if the SWUs were bought on the secondary market.

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CURRENT MARKET DATA

EXCHANGE VALUE $24.00/lb. U_3O_8
Determined as of July 31, 1983

Definition[1]
The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation
Nuexco bases the Exchange Value upon:
A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments
Nuexco does not consider the following in determining the Exchange Value:
A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1] In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of July 31, 1983

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
23.50	2.6	19	5

Definition
The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

Comments
Nuexco does not consider the following in determining the Transaction Value:
A. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.
B. The price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of Exchange Value or any other independent variable. Also excluded from consideration are all data where the delivery price is defined in such a way that it cannot currently be determined.

[2] Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161. Corresponding data for 1982 are tabulated on page 5 of Report 173.

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CURRENT MARKET DATA

CONVERSION VALUE[1] $1.10/lb. U as UF_6
Determined as of July 31, 1983

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:

A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

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[1] Monthly data for 1981 and 1982 are tabulated on page 6 of Report 173.

LOAN USE CHARGE RATE[2] 6%
Determined as of July 31, 1983

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:

A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

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[2] Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162. Monthly data for 1982 appear on page 2 of Report 173.

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CURRENT MARKET DATA

SWU VALUE $95/SWU for FY84
Determined as of July 31, 1983

Definition

The SWU (Separative Work Unit) Value is Nuexco's judgment of the price, expressed in US dollars per SWU, at which transactions for the sale of significant quantities of SWU of any origin for delivery in the specified DOE fiscal year could be concluded as of the last day of the month.

Derivation

Nuexco bases the SWU Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.
E. SWU prices at varying tails assays and varying product assays are converted to the equivalent SWU price at the DOE Reference Transaction Tails Assay (presently 0.20 weight percent U_{235}) and a product assay of three percent U_{235} assuming feed costs calculated using the Nuexco Exchange Value and Nuexco Conversion Value determined as of the last day of the same month.

Comments

Nuexco does not consider the following in determining the SWU Value:

A. The price of SWU delivered under long-term contracts from primary suppliers, such as DOE, Urenco, or Eurodif.
B. The price of SWU delivered under other than arm's length transactions.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	27.27	60.12	70.89
Belgium (comm. franc)	1,263	2,785	3,284
Canada (dollar)	29.57	65.20	76.89
Finland (markka)	134.83	297.25	350.53
France (franc)	189.72	418.27	493.24
FRG (mark)	63.19	139.31	164.28
Italy (lira)	37,383	82,416	97,188
Japan (yen)	5,780	12,743	15,028
Netherlands (guilder)	70.44	155.30	183.14
South Africa (rand)	26.37	58.14	68.57
Spain (peseta)	3,582	7,897	9,313
Sweden (krona)	185.04	407.95	481.07
Switzerland (franc)	50.92	112.27	132.39
UK (pound)	15.72	34.65	40.86
US (dollar)	24.00	52.91	62.39

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	26.70	58.87	69.42
Belgium (comm. franc)	1,237	2,727	3,216
Canada (dollar)	28.96	63.84	75.29
Finland (markka)	132.02	291.06	343.23
France (franc)	185.77	409.55	482.96
FRG (mark)	61.87	136.41	160.86
Italy (lira)	36,604	80,699	95,163
Japan (yen)	5,660	12,478	14,715
Netherlands (guilder)	68.98	152.07	179.32
South Africa (rand)	25.82	56.93	67.14
Spain (peseta)	3,507	7,733	9,119
Sweden (krona)	181.19	399.45	471.05
Switzerland (franc)	49.86	109.93	129.63
UK (pound)	15.39	33.93	40.01
US (dollar)	23.50	51.81	61.09

[1] Calculated using currency exchange rates published in the Wall Street Journal on July 29, 1983.

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CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6	per kg U as UF_6
Australia (dollar)	1.25	2.76
Belgium (comm. franc)	57.89	127.64
Canada (dollar)	1.36	2.99
Finland (markka)	6.18	13.62
France (franc)	8.70	19.17
FRG (mark)	2.90	6.39
Italy (lira)	1,713	3,777
Japan (yen)	264.93	584.08
Netherlands (guilder)	3.23	7.12
South Africa (rand)	1.21	2.66
Spain (peseta)	164.18	361.95
Sweden (krona)	8.48	18.70
Switzerland (franc)	2.33	5.15
UK (pound)	0.72	1.59
US (dollar)	1.10	2.43

SWU VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	FY 1984 per SWU
Australia (dollar)	107.94
Belgium (comm. franc)	5,000
Canada (dollar)	117.07
Finland (markka)	533.71
France (franc)	750.99
FRG (mark)	250.13
Italy (lira)	47,975
Japan (yen)	22,881
Netherlands (guilder)	278.84
South Africa (rand)	104.40
Spain (peseta)	14,179
Sweden (krona)	732.46
Switzerland (franc)	201.57
UK (pound)	62.21
US (dollar)	95.00

[1] Calculated using currency exchange rates published in the Wall Street Journal on July 29, 1983.

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CURRENT MARKET DATA

RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
2357	1983	101-300	99	US Producer	US Utility	UF_6
2366	1984	601-1000	99	European Entity	US Utility	Enriched UF_6
2411	1983	51-100	99	US Producer	US Producer	
2414	1983	Less than 50	96	European Producer	European Utility	
2423	1983	Less than 50	99	US Producer	US Utility	

Uranium Loans none reported

Secondary Market Conversion Services none reported

Secondary Market Enrichment Services

Nuexco Transaction Number	Delivery Period[2]	Approximate Quantity (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value	Tails Assay (Percent U_{235})	Buyer Group	Seller Group	SWU Origin	Remarks
2404	3Q85-4Q87	200	117-138	0.20-0.30	US Utility	European Entity	Eurodif	

[1] Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

[2] Q refers to quarter of calendar year, not fiscal year.

[3] Price is not normalized to 0.20% tails assay.

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URANIUM SUPPLY
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term[3]	Remarks
Available for Sale:			
ACTIVE			
1575		500 per year	Long Term
1818		250 per year	Long Term
2017		2,300	
2038	2,000		UF_6
2134		300 per year	1984 on
2162	40		UF_6
2191	125		UF_6
2193		800 per year	1986-90
2201	30		
2203	1,200		
2219	200		Enriched UF_6
2220	150		UF_6
2235		100 per year	1985-87
2236		200 per year	1985-89
2246	40	100	
2275	90		
2277	200		U_3O_8 or UF_6
2288	80		UF_6
2297	60	200 per year	1985-89
2299	130		UF_6
2300A	35		
2307	900		UF_6
2309	1,000		
2315	450		UF_6
2315A		950	UF_6
2320	350		UF_6
TOTAL:	7,080		
INACTIVE			
1877	40		
2121	600		
2196	500		
2271		500 per year	1984-88
TOTAL:	1,140		

[1] Measured from the date of this Report

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CURRENT MARKET DATA

URANIUM DEMAND
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term[3]	Remarks
Inquiries to Purchase:			
ACTIVE			
1459		200 per year	1985 on
1996	400		
2010		400 per year	1984-92
2167	250	250+ per year	1984-99
2187	200		
2188		250 per year	1985 on
2233	700		1984, U_3O_8 or UF_6
2304		500 per year	1988 on enriched UF_6
2310	1,000		
2313		200	
TOTAL:	2,550		
INACTIVE			
1999		50 per year	1985-90
2025		350	
2114		75 per year	1984 on
2115		200 per year	1986 on
2214	400		UF_6
2244		350 per year	1985 on
2278	250		U_3O_8 or UF_6
TOTAL:	650		

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[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CONVERSION SUPPLY
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
ACTIVE			
1609	1,500		
1840	130		
1936	1,500	200 per year	Long Term
2051	1,500		
2141	1,500		
2143	400		
2220	400		
2222	100	175	
TOTAL:	7,030		
INACTIVE			
2181	650	650 per year	Long Term
2230	300		
TOTAL:	950		

CONVERSION DEMAND
(As of 6/30/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
ACTIVE			
2129	900		
2135	400	135 per year	1986-87
2199	450	300 per year	1986 on
2188		225 per year	1985 on
TOTAL:	1,750		
INACTIVE			
2190	400	200 per year	1986 on
2194		300 per year	1986 on
2295	250		
TOTAL:	650		

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[1] Measured from the date of this Report.

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CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
	Within 1 Year	Beyond 1 Year	
Available for Loan:			
ACTIVE			
1815	1,000		UF_6
1938	1,500		UF_6
2128	2,500		
TOTAL:	5,000		
INACTIVE			
1884	600		
2036	500		UF_6
2139	2,000		
TOTAL:	3,100		
Inquiries to Borrow:			
ACTIVE			
1998	200	200	
2006	600		
2118	250		U_3O_8 or UF_6
TOTAL:	1,050		
INACTIVE	None		

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[1] Measured from the date of this Report

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ACTIVE SWU SUPPLY
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or or Near-term[2]	Delivery Period[1] (Thousands of SWUs) Intermediate or Long-term[3]
1859	—	5,000
1971	—	250
1984	120	—
2100	—	400
2168	170	430
2192	—	410
2285	250	6,000
TOTAL:	540	

ACTIVE SWU DEMAND
(As of 7/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or or Near-term[2]	Delivery Period[1] (Thousands of SWUs) Intermediate or Long-term[3]	Remarks
1850	—	500	
1856	—	500	
1860	240	—	
2117	—	400	
2233	250	—	
2237	—	150 per year	84 and beyond
2308	140	—	
TOTAL:	630		

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[1] Measured from the date of this Report.
[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
[3] For delivery beyond one year.

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RECENT DEVELOPMENTS

AUSTRALIA

Denison has entered into an agreement whereby the affected Aboriginal traditional owners would acquire a 25 percent equity position in the Koongarra project. Aboriginal representatives have informed the government of their desire to participate in the project, implying that the development of Koongarra should proceed. This move creates a dilemma for the ALP (Australian Labor Party).

If Denison is not allowed to proceed with Koongarra, the ALP claim to support the socially vulnerable becomes hollow, especially insofar as it applies to Aboriginal interests. As the affected Aboriginal community sees in the equity holding an opportunity for self-determination and growing independence from government welfare payments, a decision to prohibit Koongarra's development could be politically embarrassing for the ALP. On the other hand, if Koongarra is allowed to proceed, the apparent violation of the party's platform provision calling for a "phasing out" of the uranium producing industry could cause more internal dissension over its uranium policies.

At present, it seems that the Australian government's only practical choice is to approve all uranium developments or none. This dilemma could generate bipartisan pressure for a more pragmatic national policy toward uranium development in Australia.

1. If Aboriginal interests take up 25 percent of the equity in the project, Denison will still need to place another 50 percent with Australian interests in order to meet the guidelines of 75 percent domestic ownership.

2. Denison will still face the handicaps imposed by Australia's confused political policies. Until prospective buyers believe contracts with Australian producers will not be repudiated by politicians, Denison will find it difficult to represent itself as a reliable supplier.

3. Finally, if they can overcome these and other hurdles, Denison will still face the need to compete for market share in a uranium market characterized by excess production capacity, excess supply, and low prices. However, it should be noted that Denison's Canadian parent has an already established market position which, if transfer pricing and other problems could be solved, might ease the market entry problem.

While there is no denying the existence of substantial political and marketing uncertainties, the combination of the Aboriginal interest and a well-known Canadian producer having an established market position raises some encouraging possibilities. It is Nuexco's opinion that Denison will eventually overcome all of the obstacles to Koongarra's development and begin producing uranium. However, it is premature to speculate on the time frame in which that development will take place.

EUROPE

There is continued cautiously optimistic economic news from **Yugoslavia** which may indirectly affect the nuclear activity in that country. The Organization for Economic Cooperation and Development (OECD) recently praised Yugoslavia for its domestic austerity program and its attempt to halt the negative currency flow. This favorable report should increase the confidence of Western bankers in Yugoslavia and improve the nation's ability to finance various projects, including the procurement of uranium.

In the past, Yugoslavia has suffered from a serious foreign currency deficit, and this has made the task of purchasing uranium more difficult. Originally, it was intended that both the currently operating Krsko nuclear plant and the still planned Prevlaka plant would be supplied by domestically produced uranium. However, the Yugoslavian production facility will not come on line until the mid-1980s, and in the interim the operating Krsko plant has had to turn to foreign sources for its reloads. Due to the foreign currency crisis, Krsko has been forced to purchase uranium only as needed, and through the use of creative payment terms such as payment in the form of electricity or Yugoslavian goods and services.

With the improved financial climate and the impending startup of domestic production, however, Yugoslavia may be in a position to consider a more farsighted uranium supply policy. With Krsko running increasingly well, and thus consuming substantial amounts of fuel, it is conceivable that the Yugoslavians might use their improved economic situation to establish a procurement program based on hard currency purchases of foreign supplies until domestic production begins supplying sufficient uranium.

On the negative side, it should be noted that the OECD report refers to significant short-term problems that Yugoslavia faces in attempting to curb the nation's inflation, currently running at an annual rate of 35 percent.

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Also, there is a sizeable group of Yugoslavians who feel that in the face of continued inflation, reduced real average wages, and alarmingly high foreign indebtedness, it may be an inopportune time to pursue an aggressive nuclear policy. As in several other European countries, the gradual resurgence of nuclear power is tempered by the still difficult general economic situation.

JAPAN

The disparity between spot/near-term prices and longer-term prices, though somewhat mitigated by recent increases, continues to exert pressure for price reductions under Japan's long-term uranium contracts. However, Japanese uranium buyers, ever conscious of security-of-supply considerations, remain reluctant to press their suppliers for maximum concessions, hesitating to risk any disruption of these long-term relationships. Nevertheless, they are influenced somewhat by developments in the spot/near-term market. Over the past few years, that influence has led to the negotiation of successively lower prices.

Almost all of Japan's long-term uranium supply contracts provide for annual price negotiations. (An exception to this general practice is Energy Resources of Australia, where the formula-based price is more than $38.00.) Some of these are conducted in the year prior to the year of delivery, while others are conducted contemporaneously with delivery. Historically, the final prices negotiated for a given delivery year have fallen into a relatively narrow range regardless of when negotiated. Thus, 1982 negotiations for 1983 deliveries were settled in the range of $35.35 to $35.40 per pound U_3O_8, and only recently a Canadian producer settled for 1983 deliveries at a price of $35.50. Accordingly, it seems likely that prices for 1983 deliveries by Australia's Queensland Mines will be settled at a similar level.

The continued downtrend from year to year is illustrated by the 1983 negotiations that have been conducted for 1984 deliveries. As indicated in Report 176, most of those were settled in the range of $33.00 to $34.25 per pound U_3O_8. The increasing strength of the US dollar will cause some, priced in other currencies, to be effectively even lower.

SOUTH AFRICA

Uranium production from South African gold-uranium operations for second quarter 1983 and year-to-date is itemized in Table 1.

Table 1

REPUBLIC OF SOUTH AFRICA: URANIUM PRODUCTION FROM GOLD-URANIUM OPERATIONS (Thousands of Pounds U_3O_8)

Operation	Second Quarter 1983	Year to Date
Blyvooruitzicht	185	334
Buffelsfontein	342	646
Chemwes	297	565
Dreifontein Consolidated	88	196
ERGO	134	277
Harmony	363	729
Hartebeesfontein	241	475
JMS	384	755
Randfontein	262	532
St. Helena (BEISA)	233	431
Vaal Reefs	1,083	2,101
Western Areas	158	290
Western Deep Levels	94	188
TOTAL	3,864	7,519

Table 1 includes all of South Africa's uranium producers except for Palabora Mining Company (PMC) which is not a member of the Chamber of Mines. Total second quarter production of approximately 3.9 million pounds U_3O_8 was 5.7 percent higher than the previous quarter's output, primarily due to increases of 6.4 percent at Vaal Reefs, 12.3 percent at Buffelsfontein, 24.7 percent at Blyvooruitzicht, 10.8 percent at Chemwes, and approximately 20 percent at St. Helena (BEISA).

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RECENT DEVELOPMENTS

UNITED STATES

At a time when financial difficulties and delays are plaguing many projects, it may be worthwhile to consider some successful achievements of the US nuclear power industry.

1. Susquehanna Unit 1 is jointly owned by Pennsylvania Power and Light Company (90 percent) and Allegheny Electric Company (10 percent). Located near Berwick, Pennsylvania, this plant is a 1,050-MWe (net) boiling water reactor (BWR) designed by General Electric. Susquehanna Unit 1 was granted a fuel loading license in May 1982, a low power operating license in July 1982, and a full power operating license in November 1982. The reactor began commercial operations on June 8, 1983 and operated with a 56.5 percent capacity factor for that first month.

2. McGuire Unit 2 is a 1,180-MWe (net) pressurized water reactor (PWR) owned by Duke Power Company, designed by Westinghouse and located near Cornelius, northwest of Charlotte, North Carolina. On March 3, 1983, the NRC (Nuclear Regulatory Commission) staff issued a license to Duke Power Company for fuel loading and low power (5 percent) testing of McGuire Unit 2. The utility is expecting that this plant will go into commercial operation around March 1984. A full power license was obtained in May 1983 and the reactor operated in June with a 11.5 percent capacity factor. McGuire Unit 1, essentially identical to Unit 2, has been in commercial operation since December 1981.

3. St. Lucie Unit 2, 85 percent owned by Florida Power and Light Company, is a 777-MWe (net) PWR designed by Combustion Engineering and located on Hutchinson Island, Florida. In spite of extra regulations and new requirements, it took about the same time to build Unit 2 as it did for Unit 1. On April 6, 1983, only five years and eight months after construction started, St. Lucie Unit 2 was granted a license by the NRC for fuel loading and low power testing. That was followed by a full power operating license in June 1983. This achievement has been attributed to an innovative approach to plant construction and an efficient planning and scheduling system. Florida Power and Light took control from the start by assuming responsibility for the construction site management of the Unit 2 project. The start-up team was brought in at a very early stage in 1979 and equipment testing was initiated in completed areas as construction was proceeding. The utility is expected to bring St. Lucie Unit 2 on line in the first part of 1984.

4. Another positive note is the progress on the Palo Verde project owned by Arizona Public Service, Salt River Project, El Paso Electric Company, and Southern California Edison. Located near Wintersburg, Arizona, the Palo Verde project includes three identical 1,270-MWe (net) PWRs designed by Combustion Engineering as part of the System 80 series. Fuel loading of Palo Verde-1 is scheduled for November 1983. The NRC may issue a full power license for this unit in October of this year, in which case the utility would be planning to bring the reactor on line in May 1984, seven years and eleven months after construction started. Utility predictions indicate that Palo Verde Unit 1 could be the first System 80 reactor in service, although its schedule ranked it twelfth in 1976. One cautionary note—in late July, APS discovered damage to reactor coolant pumps and cracks in the control rod drive mechanisms' upper guide structure. The significance of those problems was not clear at press time, but delays of several weeks or longer are likely.

Two other plants are predicated to begin operations in 1983 in addition to Susquehanna Unit 1: they are Grand Gulf Unit 1, a 1250-MWe (net) General Electric BWR owned by Mississippi Power and Light Company, and Virgil Summer, a 900-MWe (net) Westinghouse PWR owned by South Carolina Electric and Gas Company. San Onofre Unit 2, a 1,100-MWe (net) Combustion Engineering PWR owned by Southern California Edison Company, is also scheduled to restart in 1983. As a result of these and other anticipated events, the Department of Energy estimates that 1983 will see a six percent increase in the nuclear generation of electricity.

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URANIUM DEMAND AND SUPPLY IN SPAIN

Introduction

Spain once planned to rely heavily on nuclear power for electricity generation, such that seventeen nuclear units comprising more than 14,600 MWe (net) were to have been operating by the mid-1980s. Reduced forecasts of load growth, escalating construction costs and a heavy foreign debt burden, among other factors, have led Spain's Socialist government to plan the indefinite deferral of six to eight units accounting for 5,847 MWe and 7,861 MWe. Thus, Spain's current plans call for nuclear generating capacity of less than half the amount originally planned to be operating by the end of this decade. A review of the historical background of Spain's nuclear power program will reveal some of the causes of the problems being encountered today.

National Energy Plans

From the 1950s to the early 1970s, Spain experienced an industrial boom, resulting in an economic growth rate of over 5 percent per year for the period. With this growth came a dependence on imports for more than 70 percent of the nation's fuel in 1973. As a result of the oil crisis that year, the government decided to base its energy policies on a national energy plan, its purpose being the prudent management of Spain's natural resources and the promotion of an independent energy program. Spain's first national energy plan, based on an annual growth rate of over 5 percent, was prepared in 1975. The most pessimistic of the several growth scenarios called for a 3.0 percent annual growth rate for the 1983-85 period and 3.5 percent for 1986 to 1990. Under this program, 70 percent of the nation's annual power needs were to be generated by coal and uranium by 1990. In 1973, coal and uranium together supplied less than 20 percent of Spain's primary energy. (That figure was 47.1 percent in 1982.) Table 1 lists the nuclear units proposed under that first plan.

Based on the assumed needs for electricity, that first plan proposed the addition of 12 nuclear units having combined capacity of 11,551 MWe net. Those units are listed in Table 1.

Table 1

ADDITIONAL NUCLEAR UNITS PROPOSED BY SPAIN'S FIRST NATIONAL ENERGY PLAN

Unit	MWe (net)
Almaraz I and II	1,860
Lemoniz I and II	1,860
Asco I and II	1,860
Cofrentes I	975
Valdecaballeros I and II	1,950
Trillo I and II	2,064
Vandellos II	982
TOTAL	11,551

Three units, comprising 1,020 MWe, were already operating at the time, so that first plan called for a total of 15 nuclear units having a combined capacity of 12,571 MWe. Subsequent plans added two more units (Regodola and Sayago, comprising 2,075 MWe net) for a total planned nuclear capacity of 14,646 MWe net.

The preparation of the national energy plan and its revision are assigned to the Ministry of Industry and Energy, and more specifically to its Commissioner of Energy and Natural Resources. Early in January 1983, the then-new Socialist government established a committee for the revision of the plan, with a membership composed of the following officials:

1. Sr. Martin Gallego—Commissioner of Energy;
2. Sra. Carmen Mestre—Director General Energy;
3. Sr. Juan Manuel Kindelan—Director General Mines;
4. Sr. Juan Tesora—Engineering Dept. ENDESA (Empresa Nacional de Electrica S.A.—owned by INI);
5. Sr. Feliciano Fuster—President GESA (General Electric S.A.);
6. Sr. Roberto Centeno—Director General CAMPSA (Compania Arendardaria del Monopolio de Petrolio S.A.—scheduled to be disbanded before the end of 1983).

Although the committee had not yet submitted to Parliament its revised energy plan, Carmen Mestre, Director General for Energy, had made public some of the committee's conclusions.

1. The government is basing its forecasts of electricity demand on an annual growth rate of 3.5-4.0 percent.
2. Nuclear power is projected to supply a 10 percent share of primary energy consumption by 1990, as compared to an average of 20 percent for the rest of Europe by that date.

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3. The government considers installed nuclear capacity of 6,700 MWe by 1990 to be sufficient when combined with increases in hydro and coal-fired facilities.

4. In order to meet its announced goal of approximately 6,700 MWe nuclear capacity installed by 1990, the government will authorize the startup of Cofrentes, Asco Unit II and one of the three units: Valdecaballeros I; Trillo I; Vandellos II.

5. Six units are indefinitely deferred—Valdecaballeros II; Lemoniz I and II; Regodola; Sayago; Trillo II.

In recent months Spain's Socialist government has given signals that it may be reconsidering the role nuclear power should play in the next revision of the national energy plan. Public announcements by Energy Director General Carmen Mestre had indicated that the government favored a national energy plan that would have minimized the role of nuclear power. However, after the Socialists' May 8 success in municipal elections, the Minister of Industry and Energy, Carlos Solchaga, dismissed the committee of experts who had been reviewing the plan. Reasoning that a minimized role for nuclear power would hinder the stimulation of the economy and the creation of jobs, a primary political objective of the Socialist party, the government will take those factors into account in the revision of the national energy plan. The publication of the plan will be delayed by the process of reconsidering those factors. It is reasonable to hope that Valdecaballeros I, Trillo I and Vandellos II will all be allowed to proceed.

Table 2 summarizes the status of nuclear power plants in Spain.

Table 2
NUCLEAR POWER PLANTS IN SPAIN

	Utility	Reactor Type	Capacity (Net MWe)	Commercial Operation	% Complete
Operating					
Zorita[1]	Union Electrica	PWR	160	3Q68 (Actual)	
Garona	Nuclenor	BWR	460	4Q70 (Actual)	
Vandellos I	HIFRENSA[2]	GCR	500	1Q72 (Actual)	
Almaraz I	HE[3]/UE[4]/CSE[5]	PWR	930	2Q81 (Actual)	
Licensed for Startup					
Almaraz II	HE[3]/UE[4]/CSE[5]	PWR	930	4Q83 (Est.)	
Asco I	FESCA[6]/ENHER[7]	PWR	930	4Q83 (Est.)	
Under Construction					
Cofrentes	HIDROLA[8]	BWR	975	2Q84 (Est.)	81
Asco II	FECSA[6]/ENHER[7]	PWR	930	4Q84 (Est.)	86
Valdecaballeros I	HE[3]/CSE[5]	BWR	975	Note 12	5
Trillo I	UE[4]/ENDESA[9]	PWR	1032	Note 12	34
Vandellos II	ENHER[7]/FECSA[6]	PWR	982	Note 12	22
Valdecaballeros II	HE[3]/CSE[5]	BWR	975	Indefinite	2
Lemoniz I	Iberduero	PWR	900	Indefinite	97
Lemoniz II	Iberduero	PWR	900	Indefinite	57
Regodola	FEDENO[10]	PWR	1000	Indefinite	0
Sayago	Iberduero	PWR	1075	Indefinite	0
Trillo II	UE[4]/ENDESA[9]	PWR	997	Indefinite	0

[1] Also known as Jose Cabrera.

[2] HIFRENSA—Hispano-Francesa de Energia Nuclear, SA

[3] HE—Hidroelectrica Espanola S.A.

[4] UE—Union Electrica

[5] CSE—Compania Sevillana de Electricidad S.A.

[6] FECSA—Fuerras Electricas de Cataluna S.A.

[7] ENHER—Empresa Nacional Hidroelectrica Ribagorzana

[8] HIDROLA—Hidroelectrica Espanola S.A.

[9] ENDESA—Empresa Nacional de Electrica S.A. (Owned by INI[11]).

[10] Fuerzas Electricas del Noroeste

[11] Institutio Nacional de Industria

[12] One of these three units will be authorized to start up; the other two will be deferred indefinitely.

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Spain's primary energy consumption during the four years from 1979 through 1982 was distributed as indicated in Table 3.

Table 3

PATTERN OF PRIMARY ENERGY CONSUMPTION
(In Percentage)

	1979	1980	1981	1982
Hydro	11.0	11.3	11.4	11.6
Coal	15.3	18.3	22.5	27.4
Nuclear	2.0	1.5	3.0	2.8
Natural Gas	2.2	2.6	3.0	3.2
Oil	69.4	66.3	60.1	55.0
TOTAL	100.0	100.0	100.0	100.0

A similar analysis applied to electricity generation for the same period shows the pattern indicated in Table 4.

Table 4

SOURCES OF ELECTRICITY GENERATION
(In Percentage)

	1979	1980	1981	1982
Hydro	32.8	31.4	31.3	30.3
Coal	21.5	29.1	33.5	39.3
Nuclear	6.3	4.7	8.6	7.8
Oil/Gas	39.4	34.8	26.6	22.6
TOTAL	100.0	100.0	100.0	160.0

Formation of ENUSA

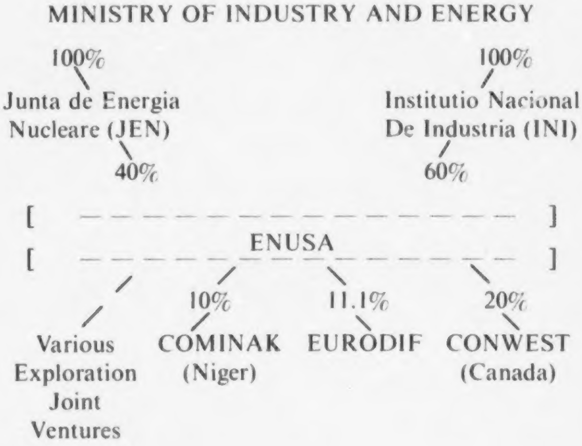
ENUSA (Empresa Nacional de Uranio SA) is a state-owned company formed to conduct three basic activities:

1. Supply of uranium to Spanish utilities;
2. Procurement and supply of enriched uranium;
3. Fuel fabrication, design and management.

Table 5 shows the ownership structure of ENUSA as well as some of its holdings.

Table 5

OWNERSHIP STRUCTURE OF ENUSA


MINISTRY OF INDUSTRY AND ENERGY
100%
100%
Junta de Energia Nucleare (JEN)
Institutio Nacional De Industria (INI)
40%
60%
ENUSA
10%
11.1%
20%
Various Exploration Joint Ventures
COMINAK (Niger)
EURODIF
CONWEST (Canada)

ENUSA's Role in the Nuclear Fuel Cycle

When ENUSA was formed, fuel contracts were still in the hands of individual utilities. Since that time, ENUSA has taken assignment of the contracts from the utilities, and has directly signed new contracts as old ones end. In the mid-1970s, the government charged ENUSA with the acquisition and maintenance of a stockpile amounting to 5 years' forward requirements for the nuclear plants proposed by the nation's first energy plan. However, the expected 5 to 6 year construction time on these units has turned into 10 to 12 years. The 5 year inventory is now closer to 10 years.

It is the implementation of the original ambitious plan in conjunction with the economic slowdown which has created the need for substantial financial resources for the operation of Spain's nuclear program. A rough estimate of the construction delays for the 12 additional units proposed by the first national energy plan (Table 1) amounts to nearly 50,000 megawatt-years. That, in addition to a 5,933 MWe loss due to cancellations and deferrals, has put a further strain on ENUSA. ENUSA is currently caught between the real requirements for the late 1980s and a plan for procurement which is based on a 10-year-old projection.

Uranium Concentrates

ENUSA obtains uranium concentrations through domestic production, joint venture operations and long-term contracts. Over the next 5 years, uranium will be supplied to ENUSA in the approximate quantities indicated in Table 6.

Table 6

ENUSA'S URANIUM SUPPLIES
(Thousands of Pounds U_3O_8 Equivalent)

Source	1983	1984	1985	1986	1987
Domestic Production	300	300	300	300	300
Canada	500	700	500	-0-	-0-
Africa	2,500	2,500	2,500	2,500	2,500
TOTAL ANNUAL	3,300	3,500	3,300	2,800	2,800

In addition, ENUSA's current inventory contains more than 10 million pounds equivalent U_3O_8. A comparison to Nuexco's forecast of annual uranium consumption for the same period, shown in Table 7, indicates that the current state of disequilibrium will worsen measurably over the next five years, absent vigorous corrective measures.

Table 7

ENUSA'S URANIUM SUPPLY-DEMAND BALANCE
(Thousands of Pounds U_3O_8 Equivalent)

	1983	1984	1985	1986	1987
SUPPLY[1]	3,300	3,500	3,300	2,800	2,800
less					
CONSUMPTION[2]	4,000	1,600	2,200	2,200	2,200
equals					
NET INVENTORY INCREASE/(DECREASE)	(700)	1,900	1,100	600	600
plus					
BEGINNING INVENTORY	10,000	9,300	11,200	12,300	12,900
equals					
ENDING INVENTORY	9,300	11,200	12,300	12,900	13,500

[1] This Report, Table 6
[2] Nuexco forecast

Conversion Services

ENUSA had originally planned its own conversion facility. After the necessary studies were completed, however, the nuclear program had slowed sufficiently to postpone the project indefinitely. ENUSA has long-term contracts with several non-US convertors, yielding a current excess of over 4 million pounds U in conversion services.

Enrichment Services

Table 8 shows approximate amounts of ENUSA's current obligations to purchase enrichment services.

Table 8

ENUSA ENRICHMENT OBLIGATIONS
(Thousands of SWUs)

	Year of Delivery				
Source	1983	1984	1985	1986	1987
DOE	100	500	600	500	600
EURODIF	600	700	1,000	1,000	1,000
USSR	400	400	400	500	500
TOTAL ANNUAL	1,100	1,600	2,000	2,000	2,100

Table 9 presents a comparison of annual supply to maximum annual requirements, indicating a cumulative surplus of one million SWUs for the period 1983-1987.

Table 9

ENUSA'S ENRICHMENT BALANCE
(Millions of SWUs)

	Year of Delivery				
	1983	1984	1985	1986	1987
SUPPLY	1.1	1.6	2.0	2.0	2.1
less					
MAX. REQ'T	1.5	1.0	1.5	1.8	1.9
equals					
ANNUAL SURPLUS/(DEFICIT	(0.4)	0.5	0.5	0.2	0.2
plus					
BEGINNING INVENTORY	6.2	5.8	6.3	6.8	7.0
equals					
ENDING INVENTORY	5.8	6.3	6.8	7.0	7.2

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Thus, by the end of 1987, ENUSA will have added another one million SWUs to inventory, on top of the 6.2 million SWUs already held in inventory as of the beginning of 1983. This surplus can of course be reduced by sales of SWUs or renegotiations with SWU suppliers.

Fuel Fabrication

The Juzbado plant located between Salamanca and the Portuguese border some 150 miles northwest of Madrid is completing the installation of equipment to produce both BWR and PWR fuel elements under General Electric and Westinghouse licenses, respectively. The various process lines are expected to complete testing during the third quarter of 1983. Commercial production is scheduled to begin by the end of 1983 or early 1984, starting with reloads for the Garona and Zorita plants. The projected production is 200 tons per year initially to meet current requirements, although it could double production in response to future demands.

Spent Fuel

Spent fuel from operating reactors has heretofore been sent to France for the Vandellos I plant and to the United Kingdom for the Garona and Zorita plants. By 1990, the total volume of spent fuel will amount to approximately 1,600 tons. Therefore, short-term needs can be met adequately by means of on-site pool storage (at the individual nuclear units). For the longer term, ENUSA has under study the design and construction of separate centralized storage facilities.

Radwaste Storage

JEN is in charge of Spain's radioactive waste storage programs. Low and medium radioactivity wastes are estimated to represent some 30,000 cubic meters by 1990. JEN has under study the application of the two most common methods, namely burial at sea and burial in a geologically stable environment, such as a salt dome. JEN is already using both methods for the waste coming from small-scale activities such as research medicine, radioisotopes, etc.

Conclusion

Spain's situation is neither particularly unique nor the result of poor management. On the contrary, sound decisions were made in the 1970s based on specific goals established by the national energy plan. But, as in numerous other countries, the change in one assumption, such as the growth rate of electricity demand, can reduce an excellent program ideal to a cumbersome and costly reality. Faced with uranium inventories of more than 10 million pounds equivalent U_3O_8 and enrichment services inventories of more than 6 million SWUs, and with both inventories scheduled to increase over the next five years, ENUSA can be expected to renegotiate as many of those commitments as possible, and to the maximum feasible extent.

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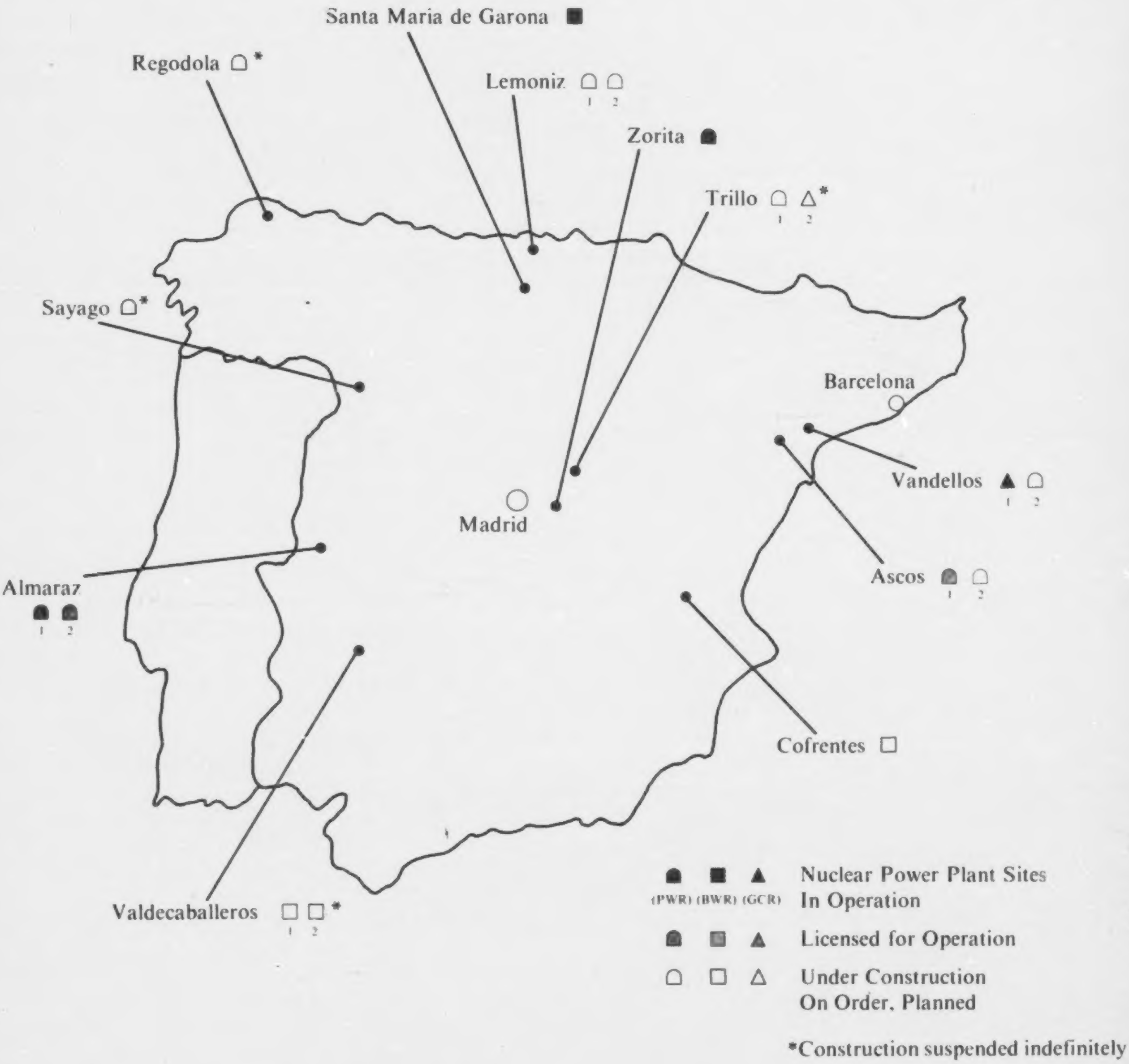
Santa Maria de Garona
Regodola *
Lemoniz 1 2
Zorita
Trillo 1 2 *
Sayago *
Barcelona
Madrid
Vandellos 1 2
Ascos 1 2
Almaraz 1 2
Cofrentes
Valdecaballeros 1 2 *
(PWR) (BWR) (GCR)
Nuclear Power Plant Sites In Operation
Licensed for Operation
Under Construction On Order, Planned
*Construction suspended indefinitely

Figure 1

DISTRIBUTION OF POWER PLANTS IN SPAIN

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GREENLAND: THE KVANEFJELD URANIUM DEPOSIT

Introduction

The Greenland Geological Survey (GGU) discovered in 1956 a large low-grade uranium deposit near the village of Narssaq in southern Greenland. Named for its geographic location on the Kvanefjeld Plateau, the deposit was discovered during the second year of uranium exploration sponsored by the Danish Atomic Energy Commission (AEK). The deposit contains an estimated 62 million tonnes of ore averaging 408 parts per million (ppm) U_3O_8, equivalent to approximately 55.7 million pounds U_3O_8. Figure 2 shows the location of the deposit in South Greenland.

Uranium mineralization occurs in association with alkaline rocks of the Ilimaussaq igneous complex. Radioactivity was noted by Danish scientists in the intrusive rocks as early as 1881. Thorium was identified as the radioactive source material in the mineral steenstrupine, a complex silicophosphate of thorium, uranium, rare earths and other metals. Radioactive occurrences in the area of the Kvanefjeld Plateau were again noted in geologic reports written by Danish geologists in 1905 and 1912.

When the initial uranium exploration program began in the summer of 1955, the Ilimaussaq complex was given priority as a favorable exploration target. The GGU assigned military personnel, under the direction of a geologic consultant, to conduct a ground radiometric survey over a designated area of the plateau. The initial results were inconclusive, but encouraging enough to continue the surveys, complimented by an airborne scintillometer survey, during the 1956 summer field season.

Radiometric surveys had been completed over most of the intrusive by the end of the second year. It was quickly concluded that the most important radioactive occurrences were associated with a sequence of flow and intruded rocks on the Kvanefjeld Plateau. The general area of radioactivity was outlined and the surface limits of important mineralization determined by detailed radiometric studies and chemical assays of rock samples. AEK officials considered the discovery to be of geologic and economic significance, and project evaluation studies have continued over the years. The main thrust of late has been devoted to the development of favorable extractive technology.

Project Evaluation

A detailed radiometric survey was made on a 50 meter grid over the most promising area designated as the mine area. Closer detailing was carried out on 5 meter grids to define the areas of highest radioactivity. The first core drilling program occurred in 1958, when 30 holes were drilled on locations of high favorability in the mine area. Average drilled depth was about 100 meters; the deepest holes were 180 meters. Each hole was terminated when the uranium content of the core decreased to less than 235 ppm U_3O_8. (All holes drilled on the property were logged with a gamma spectral system. The probe unit consisted of a 3 inch NaI detector and a Scintrex GAD-6 gamma spectrometer.) Six holes were drilled on radioactive anomalies outside the mine area in anticipation of making a new discovery; however, only trace mineralization was encountered Drill footage totaled 3,728 meters in 1958.

Drilling results of the 30 holes indicated an irregular distribution of mineralization primarily within the upper 30 meters. Frequent changes in lithology also were recorded. The highest grade mineralization was noted to occur in a layered sequence of lujavrite, a medium to coarse-grained nepheline syenite, pegmatitic lujavrite, and altered lava and gabbro. The inconsistencies in radioactivity and lithology between holes made interpretation extremely difficult. It was concluded that additional drilling would be required to determine the full potential of the deposit.

Evaluation programs were curtailed during the period 1959 to 1961. They resumed in 1962 with a limited core drilling program. Seven holes were drilled to a depth of 200 meters on radioactive anomalies outside the Kvanefjeld Plateau. The results were negative.

Geologic mapping of the Ilimaussaq intrusion also was started in 1962. The project was not completed until 1967. All geologic studies were limited to the Kvanefjeld Plateau following the mapping. Almost the entire Ilimaussaq intrusion, outside the Kvanefjeld plateau, consists of unfavorable geology for uranium mineralization. Detailed mapping of the mine area was completed to permit closer coordination of drilling with geologic and structural interpretation.

Two holes drilled previously in the mine area were deepened to 200 meters during the 1962 program. The results were again inconclusive. Mineralization proved to be low-grade and highly irregular in occurrence. The main activity for the 1962 season was the mining of 180 tonnes of ore from an adit driven 20 meters into the

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upper portion of the orebody. The mined material consisted of pegmatitic lujavrite and altered lava. The ore averaged 740 ppm U_3O_8. It was shipped to Riso National Laboratory, in Roskilde, Denmark for beneficiation tests, even though the U_3O_8 percentage was well above the average grade of the ore deposit.

A total of 1621 meters of drilling was completed during the 1969 field season. One hole was drilled to a depth of 450 meters in the mine area; however, results were again inconclusive. Two holes were drilled on an outcrop of fine-grained lujavrite to the north of the mine area. Radioactivity averaging 412 ppm U_3O_8 was encountered to the drilled depth of 200 meters. It was the first important mineralization to be found outside the mine area. Uranium resources for the mine area and the two holes drilled in the northern area were estimated at about 6100 tonnes U_3O_8, at an average grade of 365 ppm U_3O_8.

During the period 1970 through 1976, comprehensive metallurgical testing and project feasibility studies were carried out. The first regional environmental study for mining and ore processing was initiated. All study results, including technical and economic consideration, indicated project development had favorable possibilities, given increasing ore reserves to facilitate large-volume mining. A decision was made to undertake yet a fourth drilling program.

The northern area was selected for core drilling in 1977. Twenty-one holes were drilled to a depth of 200 meters for a total of 4,256 meters. Hole spacing was 145 meters. Drilling results proved to be extremely important to the future of the project. It was determined that the ore in the northern area is an extension of that in the mine area. An ore reserve study of both areas indicated the presence of approximately 62 million tonnes of ore averaging 0.90 pounds U_3O_8 per tonne. The total U_3O_8 estimate for the Kvanefjeld deposit is 55.7 million pounds. The cut-off grade is 0.60 pounds U_3O_8 per tonne.

The long period of property evaluation was concluded in 1980 with the completion of a 980 meter long exploration drift driven through the mine area and into the northern area. Approximately 4,700 tonnes of ore were mined for additional metallurgical work. Almost 1500 tonnes were shipped to Riso Laboratory for further testing of uranium extraction by a new pressure leaching process. The remaining 3200 tonnes are stockpiled at the mine site and will be shipped to Riso Laboratory as needed to complete metallurgical studies. Figure 3 is a map showing the limit of drilling, the direction and extent of the exploration drift, and the surface geology.

Geology

The Ilimaussaq intrusion is considered one of the youngest intrusions associated with the Gardar igneous province that covers much of South Greenland. The Gardar complex is made up of several generations of major intrusions and basaltic lava flows. The Gardar has been age-dated at 1,100 to 1,400 million years. The Ilimaussaq intruded Gardar lavas and related rocks about 1,000 to 1,050 million years ago.

The Ilimaussaq intrusion comprises a series of alkaline syenites and granites. The important uranium-bearing series is lujavrite, which intruded a layered sequence of Gardar syenites, lavas and gabbros in the Kvanefjeld area. Several different types of lujavrites have been described. Medium to coarse-grained rock has the highest uranium content, followed by fine to medium-grained rock. Combined, the two rock types make up most of the Kvanefjeld uranium deposit. Altered and deformed lavas and gabbros make up the remaining portion of mineralized rock (see Figure 3).

Late-stage lujavrites intruded primarily along northwest-southeast trending zones of shearing and brecciation associated with structural doming and collapse features found in the Kvanefjeld area. The main ore mineral steenstrupine occurs along the zones of weakenss in fractures and veins, and as disseminations throughout lujavrites, lavas and gabbros, forming the outer crust of the domelike structure. Moderate to intense alteration of different rocks has occurred adjacent to structural patterns. Mineralization is often more abundant along such zones. However, the degree of alteration can adversely affect the refractory qualities of the mineral steenstrupine, and the percentage of uranium recovery from altered ores is often less than desired.

Mining

Tentative mining plans call for open pit mining of the mine area and most of the northern area. The deeper ore in the northern area may be mined by underground methods. Figure 3 shows the outline of core drilling in the two areas. The outline represents an approximate surface limit of two planned open pits which could develop into one as mining progresses. Figure 4 is a photo looking southwest across the mine area and the south end of the northern area.

The first mining will begin in the mine area. Plans may include the simultaneous development of a portion of the

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deeper ore in the northern area. The purpose would be to install underground crushing and ore preparation facilities as protection against adverse winter weather conditions. An underground transportation system, probably a conveyor belt arrangement, would carry the crushed ore about four kilometers to the planned mill site on the broad plain at the foot of Ilimaussaq Mountain. Figure 5 is a photo looking northeast to Ilimaussaq Mountain. The processing plant will be located on the gentle slopes about where the drainage cuts the center of the photo.

An annual production schedule of four to six million pounds U_3O_8 is being considered. The U_3O_8 concentrate would be shipped out on boats which would be loaded at special dock facilities to be constructed on the fjord immediately north of the Kvanefjeld Plateau. Construction of the mine and mill complex would require two to three years. Final development planning is included in the current project evaluation study.

Ore Beneficiation

The AEK recognized early in the Kvanefjeld project that economic success would depend on a favorable beneficiation process. Metallurgical studies began on the first drill cores recovered in 1958. The task of ore beneficiation was assigned to the chemistry department of Riso Laboratory at that time. It was determined that conventional acid and carbonate leaching techniques were completely unsatisfactory recovery methods for the refractory ores of the Kvanefjeld deposit. An alternate recovery method was developed.

The general beneficiation process selected for the ore was sulphating roasting. A pilot plant study involved the following procedures:

1. The ore is crushed to a minus 100 mesh to liberate the uranium-bearing steenstrupine grains.
2. It is pelletized and roasted with SO_3 gas at 700°C, forming water soluble uranium salt.
3. The uranium is leached out by repeated washing with water.
4. Recovery of 40% to 70% of contained U_3O_8 is by conventional solvent extraction.

Associated minerals of zirconium, zinc, niobium and rare earths are recoverable through variations of the final recovery step.

During the years of metallurgical testing by sulphating roasting, only marginal success was achieved. The uranium recovery rate was consistently below economic levels. The recovery pilot system was changed in 1978 to a newly developed carbonate pressure leaching process. In this process, the crushed ore enters a horizontal pipe autoclave as a slurry. It is heated to the reaction temperature of 250° C for about 17 minutes as it is being forced through the autoclave. Under the influence of carbonate and oxygen, the uranium minerals are decomposed and the uranium is retained in solution. The slurry travels direct from the autoclave to filtration where the leach liquor is separated from the residue. The uranium is precipitated from the carbonate solution by reduction with hydrogen. Sodium fluoride forms as a water soluble mineral during the process. The by-product recovery of artificial fluorite (CaF_2) would be an important contribution to project economics.

Uranium recovery has increased to a more consistent level of 70 percent to 90 percent with the carbonate leaching process and potential economics of the project have greatly improved. Current feasibility studies include consideration for total development of the ore deposit. The potential recovery of by-product minerals offers additional economic incentive to the project. The final decision to move ahead with the project will be made by the Danish government. The decision will no doubt be dependent on a favorable projection of future market price and demand for uranium and the by-product minerals.

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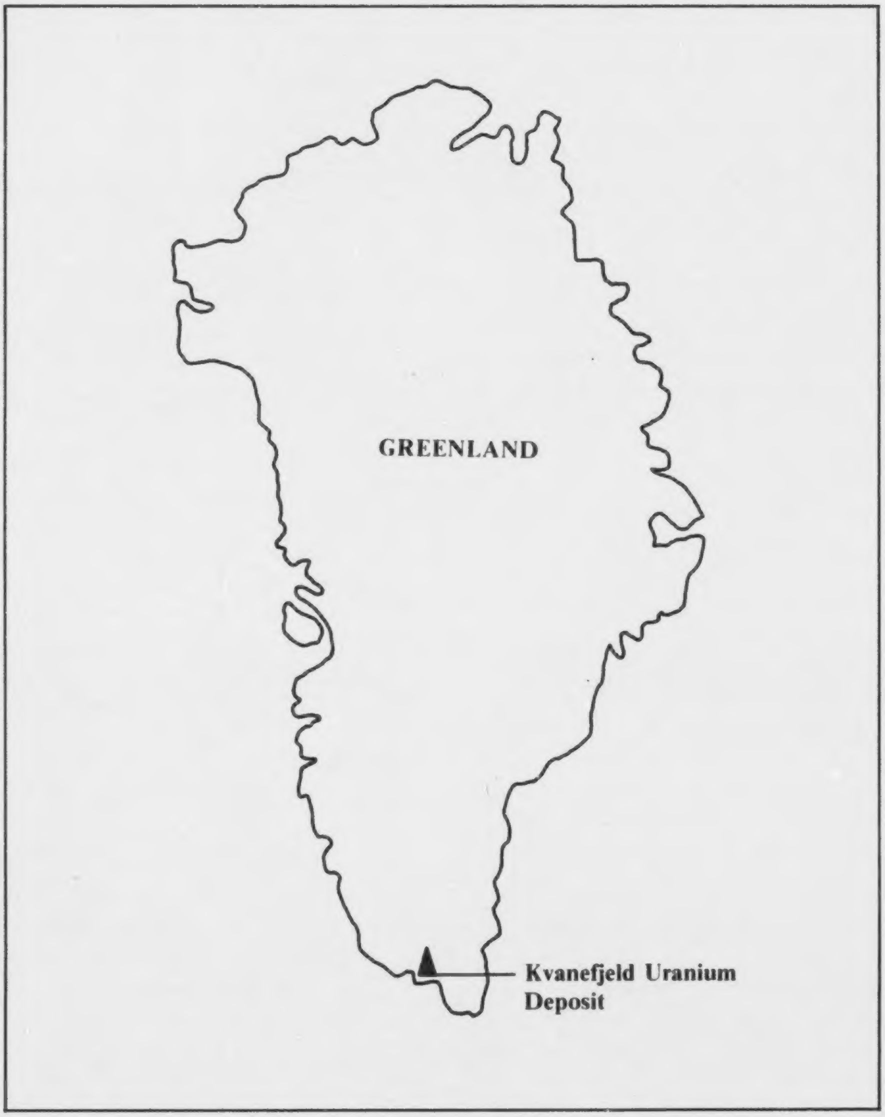
GREENLAND
Kvanefjeld Uranium Deposit

Figure 2

Location map of the Kvanefjeld uranium deposit in Southern Greenland

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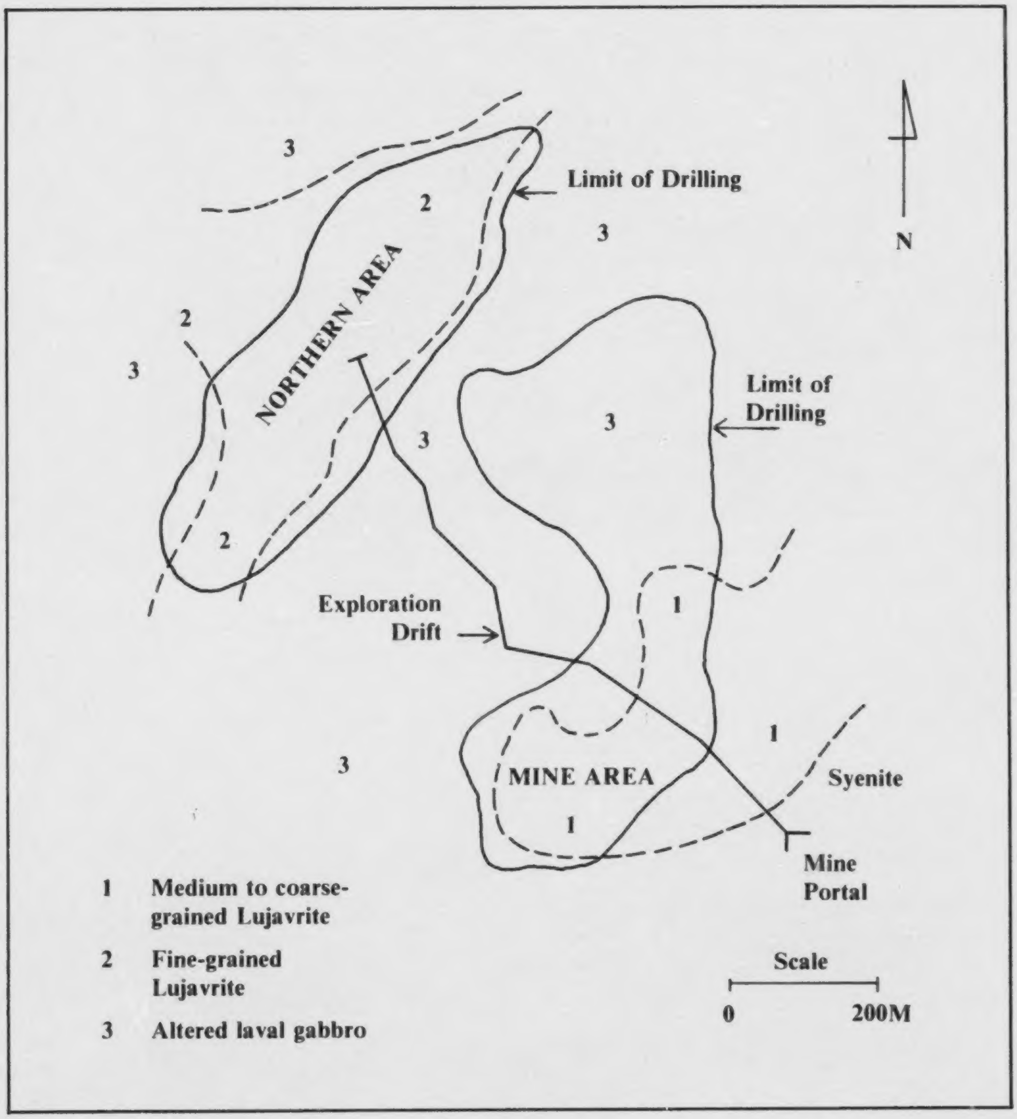
3
2
Limit of Drilling
3
N
NORTHERN AREA
2
3
Limit of Drilling
3
3
2
Exploration Drift
1
1
3
MINE AREA
Syenite
1
Mine Portal
1 Medium to coarse-grained Lujavrite
2 Fine-grained Lujavrite
3 Altered laval gabbro
Scale
0
200M

Figure 3

Map of the Kvanefjeld uranium deposit showing mineralized host rocks and limit of core drilling which also represents approximate area considered for open pit mining. Not all of drilled area is ore. The direction and extent of the exploration drift is shown also.

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RAW MATERIALS

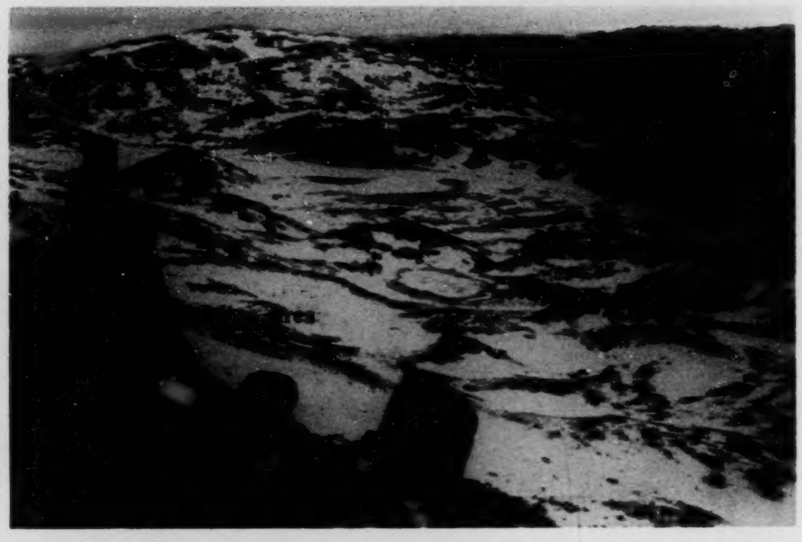

Figure 4

Looking southwest over the mine area and the south end of the northern area. The first mining will be limited to the area of low relief in the central and lower right portion of the picture.

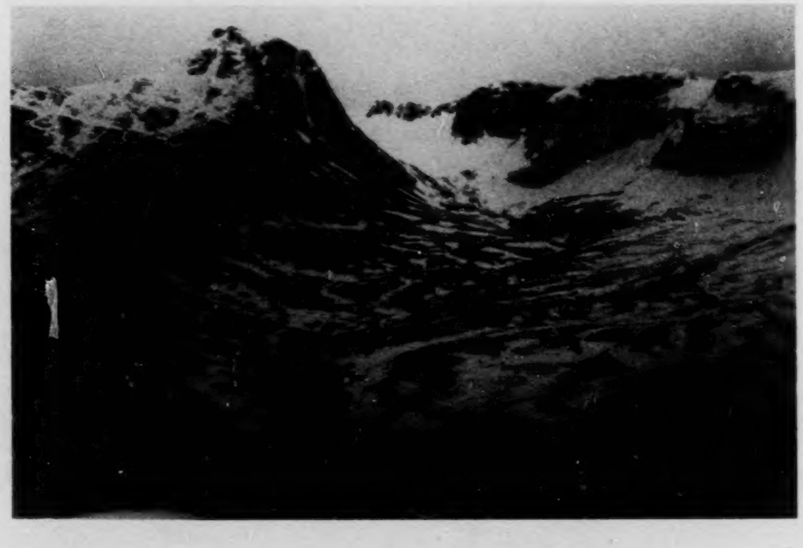

Figure 5

The tentative location for a processing plant is indicated to the left of the drainage.

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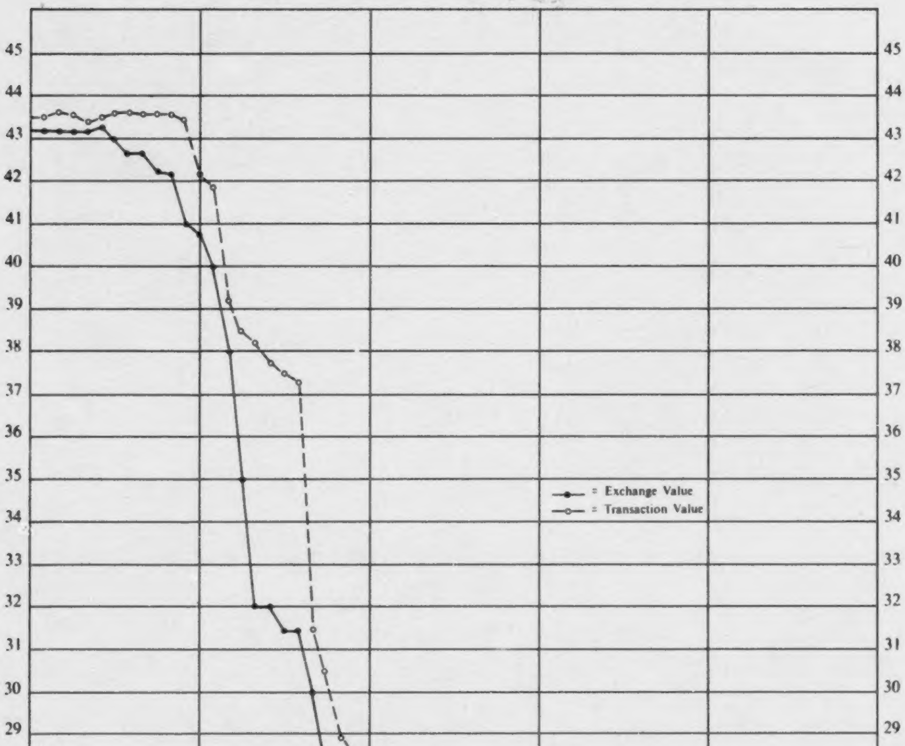
HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1979

Determined as of the last day of the month indicated



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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	**24.00**					

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	**23.50**					

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	**1.10**					

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AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates (Year 1976 = 100.0)[2]
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.00
Annual Avg. 1981	355.3	237.34
Annual Avg. 1982	367.9	—
Feb 1982	356.7	171.1
Mar 1982	360.3	171.4
Apr 1982	367.7	171.4
May 1982	367.6	171.9
Jun 1982	367.8	173.2
Jul 1982	370.0R	177.2
Aug 1982	372.4R	178.2R
Sep 1982	374.9R	178.4R
Oct 1982	378.1R	178.4R
Nov 1982	375.4R	178.5R
Dec 1982	374.6R	179.5R
Jan 1983	386.6R	179.3R
Feb 1983	388.3R	179.1R
Mar 1983	398.4R	179.0R
Apr 1983	409.7	179.4

P = Preliminary   R = Revised since last month

[1] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.

[2] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0), Table 8. Figures are being converted to an Index number. As the data are converted, the new index numbers will be inserted. Figures for the latest fourteen months shown are subject to revision.

[3] Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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GOVERNMENT STATISTICS

CANADA

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[4] [5]				
		Metal Mining, including Milling (SIC 050-099)[3]	(SIC 296)	Primary Metal Industries, non-ferrous (SIC 296-298)[6]	(SIC 298)	Chemicals and Chemical Products (SIC 372-379)[7]
Annual Avg. 1979	217.9	9.66	—	7.35	—	7.67
Annual Avg. 1980	247.2	10.80	—	8.05	—	8.50
Annual Avg. 1981	288.7	12.23	—	9.03	—	9.53
Annual Avg. 1982	288.8	13.92	—	9.98	—	10.63
Apr 1982	287.7	13.81	—	9.79	—	10.48
May 1982	288.8	13.86	—	9.88	—	10.62
Jun 1982	289.7	13.83	—	9.92	—	10.69
Jul 1982	290.3	14.02	—	10.05	—	10.73
Aug 1982	290.3	14.23	—	10.03	—	10.80
Sep 1982	292.4	14.01	—	10.18	—	10.73
Oct 1982	292.1	13.89	—	10.18	—	10.86
Nov 1982	291.3	14.28	—	10.43	—	10.90
Dec 1982	292.3	14.32	—	10.55	—	11.06
Jan 1983	292.7	14.35	—	10.72	—	11.06
Feb 1983	293.5	14.28R	—	10.74R	—	11.06R
Mar 1983	295.2	14.48R	—	10.93R	—	11.21P
Apr 1983	297.1R	13.69P	11.55P	—	9.74P	10.75P
May 1983	298.4R	—	—	—	—	—
Jun 1983	299.9	—	—	—	—	—

P = Preliminary R = Revised since last month

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[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2] Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3] The wage earner series in Nuexco reports prior to March 1983 was Metals (SIC 050-059).

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[5] Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

[6] Beginning with the April 1983 figure, Primary Metal Industries, non-ferrous will be split into SIC 296 and SIC 298.

[7] Chemical and Chemical Products prior to April 1983 was SIC 370-379. The new series is from a new survey which includes all companies and is based on a 1970 classification. The old survey included companies of 20 employees or more.

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REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Producer[5] Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[7]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[7]
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3] [6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3] [6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3] [6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Annual Avg. 1981	41.89	206.5	218.3	728,506	2,820,505
Annual Avg. 1982	47.25	233.5	248.7	707,552	3,246,071
Jan 1982	—	217.6	233.1	700,375	257,173
Feb 1982	—	220.2	236.8	705,992	250,191
Mar 1982	45.49	225.2	237.4	725,700	262,210
Apr 1982	—	228.9	241.9	707,502	252,562
May 1982	—	230.3	244.8	715,162	258,770
Jun 1982	45.77	232.1	246.7	707,552	261,361
Jul 1982	—	234.1	249.4	702,141	283,248
Aug 1982	—	236.8	253.4	705,562	276,730
Sep 1982	48.04	241.0	255.0	704,344	282,782
Oct 1982	—	243.9	260.1	701,316	285,328
Nov 1982	—	245.4	262.5	707,966	287,699
Dec 1982	49.62	246.2	263.0	683,982	288,019
Jan 1983	—	249.0	264.9	688,030	289,075
Feb 1983	—	253.1	267.4	697,089	281,413
Mar 1983	50.35	255.9	269.1	695,976R	290,586R
Apr 1983	—	257.8	270.9	697,158	286,708
May 1983	—	259.7	274.3	—	—
Jun 1983	—	260.8	—	—	—

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[1] Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly. The tonnage-weight index of average working costs per metric ton of gold ore milled for 1983 is as follows. (Base: March quarter 1982 = 100). See Nuexco report #178 page 24 for the tonnage-weighted index for 1982. Description and calculation of the index is on page 16 of Nuexco report #178.

1983: January-March 111.2

[2] Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."

[3] Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.

[4] April 1970 = 100.00.

[5] Previously known as the WHOLESALE PRICE INDEX, now the PRODUCER PRICE INDEX. The computation remains the same.

[6] Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

[7] Bulletin of Statistics, Department of Statistics, Pretoria.

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GOVERNMENT STATISTICS

UNITED STATES

	Producer Price Index— Industrial Commodities (1967 = 100)[1]	Producer Price Index— All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.75	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	115.08	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	125.79	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	132.34	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	140.05	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
Annual Avg. 1981	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
Annual Avg. 1982	312.3	299.3	289.1	207.15	12.33	12.94	9.96	8.21
Jun 1982	310.6	299.3	290.6	205.98	12.28	12.95	9.94	8.14
Jul 1982	312.8	300.4	292.2	—	12.23	12.94	10.00	8.23
Aug 1982	313.2	300.2	292.8	—	12.29	13.01	10.01	8.30
Sep 1982	312.7	299.3	293.3	208.51	12.53	13.51	10.19	8.37
Oct 1982	314.3	299.8	294.1	—	12.51	13.26	10.22	8.41
Nov 1982	315.0	300.3	293.6	—	12.53	13.22	10.26	8.45
Dec 1982	315.2	300.7	292.4	210.42	12.53	13.05	10.32	8.51
Jan 1983	313.9	299.9	293.1	—	12.63	13.33	10.34	8.53
Feb 1983	313.9R	300.9R	293.2	—	12.66	13.29	10.41	8.56
Mar 1983	313.4P	300.5P	293.4	212.83R	12.48	13.35	10.39	8.60
Apr 1983	312.6P	300.8P	295.5	—	12.67	13.34R	10.43	8.60
May 1983	313.8P	301.7P	297.1	—	12.67P	13.55P	10.50R	8.59P
Jun 1983	315.4P	302.5P	298.1	215.17P	—	—	10.53P	8.67P

P = Preliminary R = Revised since last month

[1] US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2] US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3] US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4] US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5] Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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NUEXCO

REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
P.O. Box 70
7 Cliff Street
Milson's Point
NSW 2061, Australia
Telephone: (61-2) 929-6999
Telex: 73303 (ORATOM AA)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: (81-3) 431-6031, 431-6025
Telex: 242-5060 (JATECH J)

SOUTH AFRICA

Chris I. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 8-9878 SA

TAIWAN

Edward Bee
Bee & Liang Company, Limited*
8-G FL Jen AE Mansion
NOK 37 Jen AI Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: (886-2) 721-2117
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, North Carolina 28327
Telephone: (919) 949-3622

Joe L. Hixon*
302 Lombardy
Sugarland, Texas 77478
Telephone: (713) 494-3802

W. Hardy Prentice*
11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: (216) 631-2350

SPECIAL CONSULTANTS

Claus Thiesen
Kirkland, Washington

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

*Independent contractors representing Nuexco

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NUEXCO

SEPTEMBER 1983 NUMBER 181

Monthly Report on the Nuclear Fuel Market

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)
TWX: 910-373-1760 (NUEXCO MNPK)

J. Robert Wolcott
Chairman

George White, Jr.
President

Wayne D. Fowler,
Senior Vice President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Thomas A. Boyden, V.P.

R. Wesley Miller, V.P.

Christian C. Guitton

Kim M. Peyton

Donald W. Radcliffe

Judith L. Sellers

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan
Senior Vice President

Kathryn K. Bowen

W. Scott Hickman

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Kenneth R. McCue, V.P.

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 500
Seven Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210
Telex: 4611142 (NUEX ATL)

M. Jerry Reaves, V.P.

(See inside back cover for list of Representatives and Consultants)

NUEXCO

EXECUTIVE SUMMARY
REPORT 181

Exchange Value $24.00, unchanged	The **Exchange Value** as of August 31, 1983 is **$24.00** per pound U_3O_8, unchanged from last month. Nine uranium sales transactions are reported, involving approximately 2.6 million pounds U_3O_8 *equivalent*. Six transactions involved enriched U_3O_8 and three involved UF_6.
Supply-Demand Ratio Increased slightly to 2.9:1	**Active** spot and near-term **uranium supply** amounts to 6.7 million pounds U_3O_8, *equivalent*, down .4 million pounds from last month. **Active** spot and near-term **uranium demand** fell 8%, to **2.4** million pounds U_3O_8 equivalent. Therefore, the spot and near-term **supply-demand ratio** rose slightly, to **2.9:1.**
Transaction Value Rose $.10, to $23.60	The **Transaction Value** as of August 31, 1983, is **$23.60** per pound U_3O_8. It includes 20 transactions involving a total of 2.0 million pounds equivalent U_3O_8 and covers a period of five months.
Conversion Value Unchanged at $1.10	The **Conversion Value** as of August 31, 1983 is **$1.10** per pound U as UF_6, unchanged since last month. One secondary market conversion transaction is reported, involving 51-100,000 pounds U as UF_6. Active supply remains approximately four times active demand.
Loan Use Charge Rate unchanged at 6%	The **Loan Use Charge Rate** as of August 31, 1983 is **6 percent** per annum. No uranium loan transactions are reported.
SWU Value: FY 84 $95	**The SWU Value** as of August 31, 1983 is **$95 per SWU**, unchanged since last month. The price reflects both the continuation of offers to sell large quantities of Eurodif-origin SWUs and USDOE's offer to reduce the SWU price under requirements contracts having 3.5-year termination provisions. Spot and near-term demand for secondary market enrichment services amounts to 630 thousand SWUs, unchanged from last month; spot and near-term supply amounts to 520 thousand SWUs.
SWU Transactions	This issue reports two sales of enrichment services, involving a total of 125 thousand USDOE-origin SWUs.
Analysis & Commentary	A comprehensive chronology of the WPPSS nuclear plant construction program.
Canada	Two CANDUs are shut down temporarily, and a plan exists for commercial use of small research reactors for district heating.
Focus: Australia	Presently only Nabarlek and Ranger produce uranium in Australia, and the development of several potential sites requires an attitudinal change in the government.
Focus: Canada	Nuclear reactors under construction will add 40 percent to Canada's consumption over the next eight years, but increasing uranium production could lead nonetheless to an awkward domestic supply overhang.
Japan	A recent revision in the government's plan for electricity generating capacity reduced the nuclear contribution by 23 percent, reinforcing Nuexco's prediction that the Japanese utilities will have excessive uranium inventories for more than a decade.
United States	Startup in August for St. Lucie 2 and San Onofre 2; delay for Palo Verde 1.

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NUEXCO REPORT 181
FIGURES OF THE MONTH
(August 31, 1983)

	This Month (Report 181)	Last Month (Report 180)	12 Months Ago (Report 169)
Exchange Value[1]	24.00	24.00	17.00
Transaction Value[1]	23.60	23.50	19.10
Conversion Value[2]	1.10	1.10	0.90
Loan Use Charge Rate[3]	6%	6%	6%
Near-Term Uranium Supply[4]	6.7	7.1	1.7
Near-Term Uranium Demand[5]	2.4	2.6	.16
Near-Term Supply-Demand Ratio	2.9	2.8	10.6
Recent Uranium Sales:			
Number of Transactions[6]	9	5	10
Quantity of Material[7]	1.8-3.9	0.8-1.5	2.2-4.4
Nuexco SWU Value[8]:			
FY 84	95.00	95.00	—
USDOE SWU Prices[8]:			
AFC	138.65	138.65	138.65
Requirements	149.85	149.85	149.85
Market Value of Enriched UF_6[9, 10]:			
2.5 w/o U_{235}	598.47	598.47	—
3.0 w/o U_{235}	764.27	764.27	—
3.5 w/o U_{235}	932.90	932.90	—
4.0 w/o U_{235}	1,103.64	1,103.64	—

---

[1] US $ per pound U_3O_8 equivalent

[2] US $ per pound U as UF_6

[3] Per annum

[4] Active inquiries to sell, for delivery within 12 months after contract signing (millions of pounds U_3O_8)

[5] Active inquiries to purchase, for delivery within 12 months after contract signing (millions of pounds U_3O_8).

[6] Uranium sales only; does not include loans, conversion, or SWU transactions.

[7] Millions of pounds U_3O_8, equivalent.

[8] US $ per SWU.

[9] Calculated using the Nuexco Exchange Value, Conversion Value, and 0.20 percent tails assay. Calculations before 2/28/83 used the USDOE price for AFC SWUs. As of 2/28/83, calculations use the Nuexco SWU Value for the relevant fiscal year (currently FY 84).

[10] US $ per KgU as UF_6.

INDEX TO LAST MONTH'S REPORT (180)

Topic		Page
Australia	Denison Gains Aboriginal Support for Koongarra	14
Europe	Yugoslavia's Slowly Improving Economy	14
Japan	Annual Price Negotiations	15
Raw Materials	Greenland's Kvanefjeld Deposit	23
South Africa	Uranium Production in First Half 1983	15
Spain	FOCUS: Uranium Supply and Demand in Spain	17
United States	Recent Achievements of US Nuclear Industry	16
Uranium Marketing and Prices	*Enriched Uranium and SWUs:*	
	Pricing in July 1983	1
	DOE responses to secondary market activity	2
	Natural Uranium and Secondary Market Conversion Services	
	Pricing in July 1983	1

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NUEXCO'S URANIUM PRICE FORECAST OF OCTOBER 1980

Remember the fall of 1980, about three years ago? The uranium industry was booming. Consumption was growing rapidly. Electric utilities were building inventory as a precautionary measure against insufficient uranium reserves. Some nuclear plants had been cancelled in the United States as a result of the earlier accident at Three Mile Island, but the nuclear industry was expected to recover. Nuclear power was still expanding in Canada, Europe and the Far East. Free World installed nuclear capacity exceeded 100 GWe and was expected to reach 300 GWe by 1990.

Free World production exceeded 100 million pounds for the first time in 1980. In Australia, Queensland's Nabarlek facility was just underway and ERA's Ranger facility was under construction. In Canada, Amok was preparing for startup at Cluff Lake and Key Lake was being planned. The US produced a record 43 million pounds U_3O_8 in 1980, as Phillips proceeded with the Noserock mine and Gulf Minerals with Mt. Taylor. Although spot market prices had declined from peak levels, many people believed that prices would bottom at approximately \$30 per pound U_3O_8 and rise again to new highs.

Despite these optimistic indicators, the consumption side of the industry was showing definite signs of weakness, and the years beyond 1980 appeared to be a period of increasing uncertainty. High oil prices were hindering electrical load growth and utilities throughout the world were caught in difficult financial conditions. As a result, sixteen nuclear plants had been cancelled in the US within a year.

In October, 1980, Nuexco prepared a spot market forecast with the results as shown in the accompanying graph. The forecast showed trends opposed to industry expectations, but it proved to be reasonably accurate. The exchange value is still within the \$5 per pound U_3O_8 price band that we predicted three years ago.

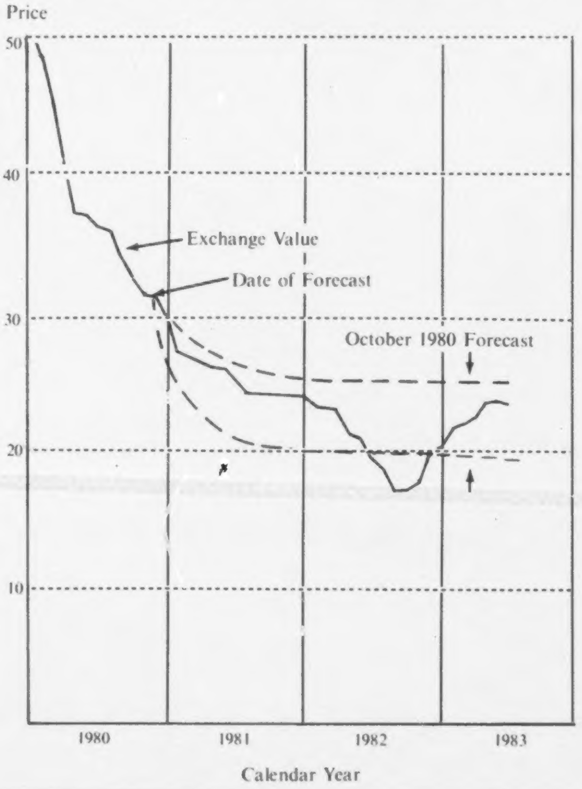
The current report is now available from Nuexco: "Uranium: World Market Study and Price Forecast: 1983 to 1997." The study presents a detailed analysis of future:

Consumption
Production
Inventories
Unfilled Requirements
Uncommitted Production
Production Costs
Spot Market Prices.

Five cases are analyzed for the period 1983 to 1997, including scenarios based on the effects of a US embargo and of different international policies.

For further information, please contact Dick Andersen at our headquarters.

Nuexco 1980 Forecast
Compared to Exchange Value
(Mid-1983 Constant Dollars per Pound U_3O_8)



NUEXCO

MONTHLY REPORT ON THE URANIUM MARKET

September 1983 No. 181

R. WESLEY MILLER, *EDITOR*

PRICING

Natural Uranium and Conversion 1
Enriched Uranium and SWUs 2

CURRENT MARKET DATA

Exchange Value and Transaction Value 3
Conversion Value and Loan Use Charge Rate 4
SWU Value 5
Prices Expressed in Selected Currencies 6
Transaction Summary 8
Supply and Demand Tables 9

RECENT DEVELOPMENTS

Canada 14
Japan 14
United States 15

ANALYSIS AND COMMENTARY

A Chronological Summary of the WPPSS Nuclear Power Plant Construction Program 16

FOCUS

Australia's Potential as a Uranium Producing Nation 21

FOCUS

Uranium Consumption and Production in Canada 26

HISTORICAL MARKET DATA

Graph of Exchange Value and Transaction Value 31
Historical Exchange Value, Transaction Value and Conversion Value 32

GOVERNMENT STATISTICS

Australia 33
Canada 34
South Africa 35
United States 36

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FOREWORD

We are deeply saddened by the recent death of A. Payne Kibbe, former Chairman and co-founder of Nuexco. Mr. Kibbe died suddenly on August 21, apparently stricken by a heart attack.

When Payne and George White, Sr., established Nuexco in 1968, they intended to make it possible for utilities to pool their uranium inventories. However, they soon realized that the industry really needed:

1. easier exchanges of ownership and custody of uranium within the industry;
2. market analysis and reporting;
3. an indicator of current spot market price.

Nuexco's current services, and the entire spectrum of uranium fuel cycle brokerage activities evolved out of that realization and are due in large measure to Payne's initiative.

Payne was also involved in numerous other activities. In 1948 he organized his own investment firm, the A. P. Kibbe Co. He remained president of the firm until 1955, when he joined the Atlas Corp.

With Atlas Corp., Mr. Kibbe served as President of the Minerals Division, and went on to become vice president-director and president-director of the corporation.

From 1967 until his death, he was chairman and chief executive officer of Monroc, Inc., a sand and gravel, ready-mix operation in Utah and Idaho.

From 1967 until 1982, he was also founder, president and chief executive officer of Nuexco, Kibbe & Associates (a uranium consulting firm) and Kibbe & Co., (a mineral prospecting and development company). In addition to his other activities, Payne was founder, principal owner and chairman of Swuco, Inc. and served on the board of directors for several other firms.

Payne's contributions as the original Chairman of Nuexco were inestimable. His vision in perceiving his customers' needs, his knowledge of the industry, his business acumen, and his management skills and ability to attract and motivate talented people were essential to Nuexco's growth and success. We will miss him and his counsel.

NATURAL URANIUM AND CONVERSION

The **Exchange Value** as of August 31, 1983 is **$24.00** per pound U_3O_8, unchanged from last month. The *Current Market Data* section of this Report lists nine uranium sales transactions, involving approximately 2.6 million pounds U_3O_8, *equivalent*. Six transactions involved U_3O_8 and three involved natural UF_6.

Active spot and near-term uranium supply (U_3O_8 or natural UF_6 offered at competitive prices, terms, and other conditions) totals 6.7 million pounds U_3O_8 equivalent, down 400 thousand pounds from last month. **Active spot and near-term uranium demand** decreased slightly to **2.4 million** pounds U_3O_8 equivalent. The spot and near-term **supply-demand ratio** was **2.9:1**, slightly higher than last month's level of 2.8.

The **Transaction Value** as of August 31, 1983, is **$23.60** per pound U_3O_8, equivalent, an increase of $.10 since last month. The current Transaction Value includes 20 transactions involving a total of 2.0 million pounds U_3O_8 equivalent, and covers a period of five months.

The **Conversion Value** as of August 31, 1983 is **$1.10** per pound U as UF_6, the same as last month. One secondary market conversion transaction is reported this month, involving approximately 50-100,000 pounds U. **Active supply** of secondary market conversion services (active inquiries to sell secondary market conversion services for delivery within the next three years) totals **7.0** million pounds U, while **active demand** amounts to **1.7** million pounds, approximately one fourth of supply.

The **Loan Use Charge Rate** remained at **6 percent** per annum. Nuexco is aware of at least three lenders holding a total of more than five million pounds available for loan at 6 percent per annum, half as U_3O_8 and half as UF_6, but there are few potential borrowers. No loan transactions are reported this month.

* * *

The Exchange Value was unchanged as of August 31. The market's consolidation of its modest $0.50 gain during the month of July was reflected by the closing of several transactions at or near $24.00. Several factors led to the virtual absence of new activities that characterized the market during the month of August.

1. Many spot and near-term buyers reduced their overall levels of market activities during the traditional summer vacation period.
2. The totals of active spot and near-term uranium supply and demand changed only slightly from the previous month.
3. Even though nine transactions representing approximately 2.6 million pounds U_3O_8 are reported in the *Current Market Data* section of this Report, six of those transactions representing more than 90 percent of the total quantity are largely attributable to negotiations begun in previous months.
4. The absence of firm purchase requirements allowed buyers to exercise more discretionary judgment with respect to sellers' offers.
5. Buyers, especially European utilities, exhibited greater resistance to sellers' offering prices due to the relatively sharp rise of the US dollar against other currencies.
6. Sellers seemed unwilling to raise their offering prices in the face of the buyers' increased resistance.

Over the past few years, certain uranium producers have tended to lower prices aggressively near the ends of their fiscal quarters, in order to record revenues for financial reporting purposes. Activities in the first eight months of this year suggest that selling pressure of that type has abated, perhaps because of producers' expectations that spot and near-term prices will continue to rise.

* * *

One secondary market conversion transaction involving approximately 50-100,000 pounds U is reported this month. The seller and buyer are both European. The buyer received a number of offers in response to a request for quotations. Most of the offers came from the USA at levels at or near the Nuexco Conversion Value. However, due to the transportation costs associated with any purchase requiring transatlantic shipment, the buyer chose to purchase higher priced secondary market conversion services from a European seller.

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PRICING

ENRICHED URANIUM AND SWUS

As of August 31, 1983, the **SWU Value for FY 1984** is **$95 per SWU,** unchanged from last month. Once again, the SWU Value reflects the prices offered by sellers of large quantities of Eurodif-origin SWUs in response to DOE's Interim Sales Contract (ISC) offer to reduce prices under requirements contracts having 3.5-year termination provision.

As of August 31, spot and near-term demand for secondary market enrichment services amounted to 630 thousand SWUs, unchanged since last month. Active supply of spot and near-term enrichment services in the secondary market amounted to 520 thousand SWUs, down slightly since last month. The *Current Market Data* section reports two transactions for FY 1984 delivery of secondary market enrichment services involving a total of 125 thousand DOE-origin SWUs. A European utility sold 10 thousand SWUs to a US utility and one US utility sold 115 thousand SWUs to another US utility.

* * *

The market for enriched uranium and enrichment services has undergone, over the past year or two, some fundamental changes that have altered DOE's attitude toward competition. DOE's aggressive efforts to maintain 100 percent of the US market have complicated activities in the secondary market. Some of those fundamental changes are discussed in the following paragraphs.

1. For five years or more, DOE has been losing business in *non-US* markets, and particularly in Europe. Much of the loss has resulted from European clients' annoyance with the US non-proliferation policies of President Carter. A related influence has been the desire on the part of DOE's European customers for self-sufficiency throughout the nuclear fuel cycle. For example, West German customers terminated a number of DOE contracts in favor of Techsnabexport (USSR) and Urenco. In other cases, European customers of DOE sold their DOE commitments to US customers of DOE, usually replacing the buyer's corresponding DOE commitment.

2. Two years ago, before Eurodif enrichment services were being offered to the US market, DOE had no domestic competition. Once European SWUs began to penetrate the US market, DOE became concerned about the loss of its domestic market, and reacted with efforts aimed at maintaining market share.

3. DOE's actions appear to be aimed at maintaining 100 percent of the US market and approximately one third of the world's enrichment market. DOE has taken three notable actions with those objectives in mind:

a. By holding SWU prices at their current levels when the latest price determination was made earlier this year, DOE interrupted a string of SWU price increases dating back ten years.

b. The Interim Sales Contract, sometimes called the mini-deal, offers holders of requirements contracts having 3.5 year termination provisions the opportunity to pay the lower AFC price for SWUs, in exchange for which they would agree not to terminate SWU deliveries for FY 83-85.

c. DOE is proposing the US (Utility Services, formerly known as the Facility Requirements) contract, the exact terms and conditions of which have not yet been revealed. The draft version and preliminary comments from DOE indicate that the US contract will give DOE clients more favorable terms and conditions in exchange for the surrender of their rights to use non-US enrichment services.

4. Non-DOE suppliers of enrichment services have large excess capacity and are competing vigorously for the available market. Moreover, the USA is adding capacity and Japan is planning to do so. National nuclear power programs continue to fall well short of planned levels, so there is no possibility that the world's enrichment capacity could be fully utilized during this centry. If DOE succeeds in retaining the US market, it will do so at the expense of Urenco, Eurodif and Techsnabexport.

* * *

Japanese utilities rely primarily on the USDOE for enrichment services. Currently they are reviewing DOE's Interim Sales Contracts (ISC) offered to holders of 3.5-year requirements contracts for FY83-85 deliveries. As is the case throughout the nuclear fuel cycle, Japanese utilities are sensitive to supplier relations and cautious about the future of secondary market prices. Although sellers in the secondary SWU market have reduced their offering prices to remain competitive, the five Japanese companies holding a total of eight USDOE requirements contracts having 3.5-year termination provisions appear to be leaning toward accepting the ISC. However, they would like to delay that decision until they have had the opportunity to study the terms and conditions of the proposed Utility Services contract.

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CURRENT MARKET DATA

EXCHANGE VALUE $24.00/lb. U_3O_8
Determined as of August 31, 1983

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1] In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of August 31, 1983

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
23.60	2.0	20	5

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

Comments

Nuexco does not consider the following in determining the Transaction Value:

A. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.
B. The price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of Exchange Value or any other independent variable. Also excluded from consideration are all data where the delivery price is defined in such a way that it cannot currently be determined.

[2] Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161. Corresponding data for 1982 are tabulated on page 5 of Report 173.

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CURRENT MARKET DATA

CONVERSION VALUE[1] $1.10/lb. U as UF_6
Determined as of August 31, 1983

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:

A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

[1] Monthly data for 1981 and 1982 are tabulated on page 6 of Report 173.

LOAN USE CHARGE RATE[2] 6%
Determined as of August 31, 1983

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:

A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[2] Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162. Monthly data for 1982 appear on page 2 of Report 173.

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CURRENT MARKET DATA

SWU VALUE $95/SWU for FY84
Determined as of August 31, 1983

Definition

The SWU (Separative Work Unit) Value is Nuexco's judgment of the price, expressed in US dollars per SWU, at which transactions for the sale of significant quantities of SWU of any origin for delivery in the specified DOE fiscal year could be concluded as of the last day of the month.

Derivation

Nuexco bases the SWU Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.
E. SWU prices at varying tails assays and varying product assays are converted to the equivalent SWU price at the DOE Reference Transaction Tails Assay (presently 0.20 weight percent U_{235}) and a product assay of three percent U_{235} assuming feed costs calculated using the Nuexco Exchange Value and Nuexco Conversion Value determined as of the last day of the same month.

Comments

Nuexco does not consider the following in determining the SWU Value:

A. The price of SWU delivered under long-term contracts from primary suppliers, such as DOE, Urenco, or Eurodif.
B. The price of SWU delivered under other than arm's length transactions.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	27.28	60.15	70.93
Belgium (comm. franc)	1,294	2,852	3,364
Canada (dollar)	29.58	65.21	76.90
Finland (markka)	137.58	303.30	357.66
France (franc)	194.11	427.94	504.65
FRG (mark)	64.48	142.16	167.64
Italy (lira)	38,523	84,929	100,152
Japan (yen)	5,911	13,032	100,152
Netherlands (guilder)	72.17	159.11	187.62
South Africa (rand)	26.96	59.44	70.09
Spain (peseta)	3,647	8,041	9,482
Sweden (krona)	189.74	418.31	493.29
Switzerland (franc)	52.39	115.51	136.21
UK (pound)	16.02	35.31	41.64
US (dollar)	24.00	52.91	62.39

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
Australia (dollar)	26.83	59.14	69.75
Belgium (comm. franc)	1,272	2,805	3,308
Canada (dollar)	29.09	64.13	75.62
Finland (markka)	135.28	298.25	351.70
France (franc)	190.88	420.81	496.24
FRG (mark)	63.41	139.79	164.84
Italy (lira)	37,881	83,514	98,483
Japan (yen)	5,813	12,815	15,112
Netherlands (guilder)	70.97	156.45	184.50
South Africa (rand)	26.51	58.45	68.92
Spain (peseta)	3,587	7,907	9,324
Sweden (krona)	186.58	411.34	485.07
Switzerland (franc)	51.52	113.58	133.94
UK (pound)	15.75	34.72	40.94
US (dollar)	23.60	52.03	61.35

[1] Calculated using currency exchange rates published in the Wall Street Journal on August 31, 1983.

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CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6	per kg U as UF_6
Australia (dollar)	1.25	2.76
Belgium (comm. franc)	59.30	130.73
Canada (dollar)	1.36	2.99
Finland (markka)	6.31	13.90
France (franc)	8.90	19.61
FRG (mark)	2.96	6.52
Italy (lira)	1,766	3,893
Japan (yen)	270.94	597.31
Netherlands (guilder)	3.31	7.29
South Africa (rand)	1.24	2.72
Spain (peseta)	167.17	368.55
Sweden (krona)	8.70	19.17
Switzerland (franc)	2.40	5.29
UK (pound)	0.73	1.62
US (dollar)	1.10	2.43

SWU VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	FY 1984 per SWU
Australia (dollar)	107.99
Belgium (comm. franc)	5,121
Canada (dollar)	117.09
Finland (markka)	544.57
France (franc)	768.36
FRG (mark)	255.24
Italy (lira)	52,488
Japan (yen)	23,399
Netherlands (guilder)	285.67
South Africa (rand)	106.72
Spain (peseta)	14,438
Sweden (krona)	751.07
Switzerland (franc)	207.39
UK (pound)	63.40
US (dollar)	95.00

[1] Calculated using currency exchange rates published in the Wall Street Journal on August 31, 1983.

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CURRENT MARKET DATA

RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
2408	1983-84	301-600	98	Canadian Producer	US Utility	
2413	1984	51-100	99	European Entity	US Utility	UF_6
2416	1984	51-100	100	European Entity	US Utility	UF_6
2433	1984	101-300	indeterminate	Canadian Producer	European Utility	UF_6 Not arm's length
2434	1983	51-100	100	US Producer	US Utility	
2442	1984-88	301-600	indeterminate	US Producer	US Utility	Price related to market
2444	1983-86	1001-2000	unknown	Canadian Producer	Unknown	
2448	1983	Less than 50	100	European Producer	US Producer	
2450	1983	Less than 50	100	US Producer	US Utility	

Secondary Market Conversion Services

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller	Buyer	Remarks
2449	1983	51-100	216	European Entity	European Utility	Included other considerations

Secondary Market Enrichment Services

Nuexco Transaction Number	Delivery Period[2]	Approximate Quantity (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value	Tails Assay (Percent U_{235})	Buyer Group	Seller Group	SWU Origin	Remarks
2359	1984	10	118	.20	US Utility	European Utility	DOE	
2431	1984	115	122	.30	US Utility	US Utility	DOE	

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[1] Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

[2] Q refers to quarter of calendar year, not fiscal year.

[3] Price is not normalized to 0.20% tails assay.

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URANIUM SUPPLY
(As of 8/31/83)

Nuexco	Delivery Period[1] (Thousands of Pounds U_3O_8)		Remarks
Project Number	Spot or Near-term[2]	Intermediate or Long-term[3]	
Available for Sale:			
ACTIVE			
1575		500 per year	long term
1818		250 per year	long term
2017		2,300	
2038	2,000		UF_6
2134		300 per year	1984 on
2191	125		UF_6
2193		800 per year	1986-90
2201	30		
2203	1,200		
2220	150		UF_6
2235		100 per year	1985-87
2236		200 per year	1985-89
2246	40	100	
2275	70		
2288	80		UF_6
2297	60	200 per year	1985-89
2300	100		U_3O_8 or UF_6
2307	900		UF_6
2309	1,000		
2315	450		UF_6
2315A		950	UF_6
2320	350		UF_6
2331	160		UF_6
TOTAL:	6,715		
INACTIVE			
1877	40		
2118A	300		U_3O_8 or UF_6
2121	600		
2271		500 per year	1984-88
2274		500 per year	1985-91
TOTAL:	940		

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[1] Measured from the date of this Report

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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CURRENT MARKET DATA

URANIUM DEMAND
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term[3]	Remarks
Inquiries to Purchase:			
ACTIVE			
1459		200 per year	1985 on
2010		400 per year	1984-92
2167	250	250 per year	1984-99
2187	200		
2188		250 per year	1985 on
2233	700		1984, U_3O_8 or UF_6
2304		500 per year	1988 on
2310	500		enriched UF_6
2313		200	
2316	150		UF_6
2317	550		
TOTAL:	2,350		
INACTIVE			
1999		50 per year	1985-90
2025		350	
2114		75 per year	1984 on
2115		200 per year	1986 on
2214	400		UF_6
2244		350 per year	1985 on
TOTAL:	400		

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[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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LOAN SUPPLY AND DEMAND
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
1815	1,000		UF_6
1938	1,500		UF_6
2128	2,500		
TOTAL:	5,000		
INACTIVE			
1884	600		
2036	500		UF_6
2139	2,000		
TOTAL:	3,100		
Inquiries to Borrow:			
ACTIVE			
2118	250		U_3O_8 or UF_6
TOTAL:	250		
INACTIVE	None		

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[1] Measured from the date of this Report

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CURRENT MARKET DATA

CONVERSION DEMAND
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
ACTIVE			
1609	1,500		
1840	130		
1936	1,500	200 per year	Long Term
2051	1,500		
2141	1,500		
2143	400		
2220	400		
2222	80	175	
TOTAL:	7,010		
INACTIVE			
2181	2,000	650 per year	Long Term
2230	300		
TOTAL:	2,300		

CONVERSION SUPPLY
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
ACTIVE			
2129	900		
2199	650		
2188		225 per year	1985 on
2253	170		
TOTAL:	1,720		
INACTIVE			
2135	400	135 per year	1986-87
2190	400	200 per year	1986 on
2194		300 per year	1986 on
2295	250		
TOTAL:	1,050		

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[1] Measured from the date of this Report.

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CURRENT MARKET DATA

ACTIVE SWU SUPPLY
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or or Near-term[2]	Intermediate or Long-term[3]	Remarks
1859	—	5,000	
1971	—	250	
1984	120	—	
2100	—	200	
2192	—	410	
2273	150	—	
2285	250	6,000	
2293	—	250	
TOTAL:	520		

ACTIVE SWU DEMAND
(As of 8/31/83)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or or Near-term[2]	Intermediate or Long-term[3]	Remarks
1850	—	500	
1856	—	500	
1860	240	760	
2117	—	200	
2233	250	—	
2237	—	150 per year	84 and beyond
2308	140	—	
TOTAL:	630		

[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

[3] For delivery beyond one year.

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RECENT DEVELOPMENTS

CANADA

CANDU reactors (pressurized heavy water-moderated and -cooled) have a superior operating record: of the top six nuclear stations in the Free World ranked by average lifetime capacity factor, five are CANDUs. Consequently, the occurrence of problems with two CANDUs in one week in August is noteworthy.

On August 1 the first pressure tube rupture ever in a CANDU reactor occurred in Pickering Unit 2 (Ontario Hydro). Radioactive heavy water escaped from the fuel channel in the form of superheated steam, condensed inside the reactor building and collected on the floor. The subsequent removal of 12 fuel bundles was hampered by steam damage to two fueling machines.

On August 4 a leak of seven liters of radioactive water from the cooling system of Pickering Unit 1 caused a shut-down. The leak was from a tube in a moderator heat exchanger and allowed radioactive tritium to reach Lake Ontario. The utility is plugging additional tubes in the heat exchanger during the shutdown.

Facing a setback similar to those frequently experienced by other utilities, Ontario Hydro will not have Units 1 and 2 back in operation until October at the earliest.

* * *

The Canadian government is considering a plan for Slowpoke III 2 MWe reactors to supply heat to northern Canadian communities. The Slowpoke III is part of a series of small units designed originally for research use in universities. The proposal to use the design commercially may have a long-term effect on the market for uranium. Although the reactors consume little fuel and have been proposed for use only as hot water generators in remote regions, the success of such a program ultimately could increase public acceptance of nuclear energy in general and improve the business climate for utilities. Furthermore, the widespread use of nuclear power for district heating one day would make a substantial contribution to uranium demand. In that event, uranium would cease to be a single purpose commodity.

JAPAN

The Electric Power Resources Development Coordination Council (EPRDCC) of the Ministry of International Trade and Industry (MITI) recently announced another in a series of changes to the government's long-term plan for the development of electricity generating capacity. Table 1 summarizes the planned distribution of electricity sources.

Table 1

GOVERNMENT PLAN FOR ELECTRICITY GENERATING CAPACITY

Source	Installed by 1991 (MWe)	Percent of Total
Hydro Electric	37,600	19.9
Fossil Fuel	115,900	61.4
Nuclear	35,300	18.7
TOTAL	188,800	

The planned nuclear power contribution of 35,300 MWe represents a 23 percent reduction from the 46,000 MWe target announced by the EPRDCC earlier this year. The reduction reflects a reappraisal of Japan's overall economic growth and the related growth of demand for electricity, and marks an adjustment to the realities of nuclear power plant licensing and construction.

The Japanese utilities had anticipated a "realistic" nuclear power generating capacity of 37,350 MWe by 1991, a figure almost 20 percent lower than previous government projections (Nuexco Report 179, July 1983). The new government target of 35,300 MWe constitutes an endorsement of current industry plans. Nuexco's latest published forecast anticipates approximately 33,500 MWe of nuclear generating capacity by 1991. Presently installed capacity is 17,177 MWe, so the achievement of this reduced target would still represent an increase of approximately 100 percent in the next eight years.

Most Japanese utilities committed themselves in the 1970s to long-term uranium contracts that would have supported the growth of nuclear capacity to as much as 60,000 MWe by 1985. The government's reduction of its official target for 1991 reinforces Nuexco's previously stated conclusion that Japanese utilities' collective fuel needs will be met under existing contracts at least until the mid-1990s. According to Nuexco's estimates:

1. Nuclear plants in Japan will consume an average of 10 to 12 million pounds U_3O_8 per year over the next decade.

2. The country's current inventory amounts to more than 100 million pounds U_3O_8 equivalent, in various forms.

3. Approximately 200 million pounds are scheduled for

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delivery under current contracts.

4. The total inventory, in all forms, could exceed 200 million pounds by 1995.

The determination of what inventory level is desirable depends on the buyer's unique situation and outlook, but in the case of Japan, there is general agreement on the existence of a large surplus. The amount desirable has not yet been decided, but one Japanese analyst has estimated that as much as 50 million pounds equivalent U_3O_8 will be excess by the end of this decade. The question of whether to take any action to reduce the surplus is subject to the interaction of several conflicting factors.

1. Disposing of surplus inventory in the secondary market would improve a utility's cash flow situation, due to the reduction of interest charges, as well as to the cash received from the sale.

2. It would be politically difficult for a Japanese utility to sell uranium at a price lower than the prices that it is paying presently or that it has paid in the past under long-term contracts.

3. The inventory surplus has not yet reached the levels anticipated for 5-10 years from now, so there is little perceived urgency to act.

4. The sale of uranium would certainly appear risky to a typically conservative Japanese utility, even though other analysts having different motivations and different circumstances might consider it more risky to maintain a large surplus.

* * *

In recent related events:

1. Tokyo Electric Power Co. (TEPCO) successfully initiated test operation of its Fukushima II-2 BWR (1100 MWe) and commercial operation is scheduled for January 1984. TEPCO's nuclear capacity at that time will be 6,900 MWe, or 19 percent of its total generating capacity.

2. Tohoku Electric Power has begun public hearings prior to licensing application for its Onagawa-2 BWR (825 MWe). Commercial operation is scheduled for 1992.

3. Kansai Electric Power plans public hearings for its Ohi plants 3 and 4 (both 1200 MWe PWRs) in January 1984. Commercial operation for the plants is scheduled for 1990 and 1991, respectively.

UNITED STATES

In early August San Onofre Unit 2, an 1100 MWe PWR, began full power operation in North San Diego County. Building was begun in 1974 on Unit 2 and on Unit 3, which Southern California Edison expects will reach criticality this month.

* * *

Report 180 for August 1983 contains an error on page 16 in the US Recent Developments section. The last sentence of the third paragraph states that Florida Power and Light Company is expected to bring St. Lucie 2 on line next year. Actually St. Lucie 2 commenced full capacity commercial operation on August 8, 1983, less than six years after ground was broken.

The US Recent Developments section of Report 180 also discusses the possibility of a delay in the operation of Arizona Public Service Company's Palo Verde 1 reactor because of damage to the coolant pumps and control rod drive mechanisms incurred during a hot functional test. Fuel loading will in fact be postponed from November 1983 until May 1984 and full power operation is not expected until the end of 1984.

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ANALYSIS & COMMENTARY

A CHRONOLOGICAL SUMMARY OF THE WPPSS NUCLEAR POWER PLANT CONSTRUCTION PROGRAM

1957 Nineteen operating public utility districts and the cities of Ellensburg, Richland, Seattle, and Tacoma form the Washington Public Power Supply System (WPPSS). Working as a municipal corporation and a joint operating agency, WPPSS is set up to build dams and power plants. Headquarters are located in the small city of Richland in southeastern Washington. The growth prospects in the Pacific Northwest look especially bright (7 percent annually). Many of the 23 members of the agency's board are farmers or small businessmen who are neophytes in the nuclear business. Most of the 88 utilities involved are owned by municipalities. There are only four investor-owned utilities; they are not represented on the WPPSS executive board but they are represented on the owners' committee. Washington Water Power (Spokane) and Puget Sound Power and Light (Bellevue) each own 5percent interests in Unit 3. Portland General Electric and Pacific Power and Light each own 10 percent shares of Unit 3. Pacific Power and Light also owns 10 percent of Unit 5. WPPSS owns the balance but splits its vote with BPA on the owners committee.

[The Bonneville Power Administration (BPA) is a US government agency that sells electricity from federal dams to northwestern utilities. BPA's administrator since 1977 has been Peter T. Johnson. The former chief (1972-77) was Donald Hodel, now US Energy Secretary.]

1972-1975 Following BPA projections of high growth rates, WPPSS orders Units 1, 2 and 3. BPA backs all the bonds issued for Units 1 and 2, and 70 percent of the bond value for Unit 3. Unit 1 is a 1250 MWe (net) PWR to be supplied by Babcock & Wilcox and located at Richland, Washington. Unit 2 is an 1100 MWe (net) BWR to be supplied by General Electric and located at Richland, Washington. Unit 3 is a 1240 MWe (net) PWR to be supplied by Combustion Engineering and located at Satsop, Washington.

March 1973 Construction permit (CP) issued for Unit 2.

1975 Standard and Poor's Corp. (S&P) rates the Unit 1-3 bonds AAA (until January 14, 1983). Moody's Investors Service (Moody's) rates them at A1 (until May 1983).

1977 Because of a barrage of unusually heavy rains, mud slides occur in the 8.5 million cubic yards of dirt (an entire hillside) that had to be relocated at a plant site to build stable foundations. Cleanup, overtime pay, and restocking the Chehalis river with fish cost WPPSS $20 million.

April 1978 Unit 3 receives CP.

1980 BPA warns WPPSS that power demand in the 1980s is still going to outstrip supply. WPPSS orders Units 4 and 5, essentially identical to Units 1 and 3, respectively. A change in federal rules passed by Congress in 1973 makes it impossible for BPA to back the Units 4 and 5 bonds and maintain its tax-exempt status. Instead the bonds are supported by "take or pay" contracts with 88 utilities in Washington, Oregon, Idaho, Montana, Wyoming, and Nevada. The "take or pay" contracts are thought to require the utilities to pay for the projects whether electricity is eventually delivered or not.

1980 S&P rates the units 4 and 5 bonds A (until January 1982). Moody's rates them A1 (until June 1981).

March 1981 WPPSS files a suit against Exxon Nuclear to protect itself from "an anticipatory breach of contract" relating to $500 million in nuclear fuel. The uranium market price exceeds by far the signed contract price. Exxon has indicated that delays and design changes render the contract unworkable.

June 1981 WPPSS sells 340,500 DOE SWUs. The SWUs, from Units 4 and 5, are scheduled for delivery in FY 86, 87.

Nov. 3, 1981 Washington State voters approve Initiative 394 requiring voter approval before bonds can be issued to complete Units 1-3. The initiative is supported by the "Don't Bankrupt Washington Committee." The initiative would become effective on July 1, 1983.

November 1981 WPPSS breaches its uranium contract with Western Nuclear, refusing deliveries slated for Units 4 and 5. The breached contract accounts for nearly 80 percent of Western Nuclear's anticipated revenues in 1982 and 90 percent in 1983.

December 1981 WPPSS files suit against Western Nuclear and its parent Phelps Dodge in the US District Court for Western Washington (Judge Walter T. McGovern). WPPSS claims Western Nuclear and 10 other suppliers conspired to fix prices and that the uranium contract with Western Nuclear should be voided.

End of 1981 Unit 1 is 53 percent complete. Unit 2 is 88 percent complete. Unit 3 is 43 percent complete.

1982 The total projected price of $4.1 billion for the projects has exploded to $23.8 billion.

Jan. 7, 1982 Moody's suspends ratings on bonds issued in connection with Units 4 and 5, citing the likelihood that the plants would be terminated.

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January 1982 Over the past 3 years, BPA has raised its wholesale electric rates three times for a compounded increase of 478 percent. Projected construction cost of Units 1-3 has increased from $3.1 billion to $12.5 billion.

Jan. 20, 1982 WPPSS wants to buy 6.4 million pounds of U_3O_8 for Unit 3 and 5.5 million pounds for Unit 2 for reloads between 1987 and 1996. The bidding deadline is set at March 15.

Jan. 22, 1982 The WPPSS executive board votes to cancel Units 4 and 5. The decision still has to be approved by the owners' committee (88 utilities).

January 1982 S&P downgrades its ratings on Unit 4 and 5 bonds from A to BBB+. Ratings on 7 of the cancelled project participants are also downgraded: Public Utility District (PUD) No. 1 of Snohomish County, PUD No. 1 of Clark County, PUD No. 1 of Grays Harbor City, PUD No. 1 of Springfield, Oregon, PUD No. 3 of Mason County, PUD No. 2 of Pacific County, PUD City Division of Tillamook, Oregon.

Feb. 5, 1982 The owners committee accepts the cancellation of Units 4 and 5. Consequences: $343 million in contract closeout costs (not counting $188 million already spent in contract closeouts since October 1981) and nearly $30 billion in bond principal and interest over the next 30 years. The termination plan (for over 150 site contractors) requires a $94.6 million loan commitment from the public utility district partners in WPPSS and the one investor-owned utility involved (Pacific Power and Light, 10 percent).

February 1982 WPPSS sells 266,730 DOE-origin SWUs, formerly scheduled for Unit 5, for 8/82 delivery.

February 1982 Gardinier Inc. offers to settle the disputed 1976 contract for slightly more than the $25.3 million WPPSS figured it needed to buy out its commitment to take approximately 5.4 million pounds of uranium remaining to be delivered. The contract price is $59.05/lb versus $23.50/lb for the current market price, but Gardinier's production costs and future capability are not as favorable as expected.

March 1982 WPPSS, in breach of contract with Western Nuclear for refusing uranium deliveries, is ordered by a federal court in Washington State to pay the amount by which the contract price exceeds the market price—$53.6 million. Western Nuclear moves in a court in Oklahoma to attach the UF_6 (value estimated at $56 million) and WPPSS appeals in San Francisco. Antitrust allegations against Western Nuclear are dismissed but WPPSS will appeal in Seattle before Judge McGovern.

March 15, 1982 WPPSS extends until April 15 the deadline for filing bids to supply uranium for Unit 2 and Unit 3. Since these reloads are subject to litigation with Exxon, observers believe WPPSS solicits bids in order to elicit a price for use in estimating damages relative to that litigation.

April 1982 Fuel supplies for the WPPSS plants are as follows:

Unit 1: First core fabricated.
First core (from Unit 4) enriched.
3 million pounds U_3O_8 plus Western Nuclear contract.
500,000 pounds U_3O_8 acquired from Gardinier.
380,000 KgU as UF_6, acquired from Rio Algom.

Unit 2: First core fabricated.
250,000 pounds U_3O_8 in inventory.
Reloads through 1994 to be supplied by Exxon (in litigation).

Unit 3: First core enriched.
Reloads through 1996, to be supplied by Exxon (in litigation).

Units 4-5: 16,000 pounds U_3O_8 in inventory (sold May 12, 1983). All other uranium transferred to Unit 1.

Kerr McGee Commitments: About 3 million KgU of conversion through 1986.

DOE Commitments: Some 300,000-400,000 excess SWUs for sale.

April 9, 1982 Washington State Initiative 394 is challenged by the Justice Department at the request of the Department of Energy (DOE) as being unconstitutional at both the federal and state levels. Three trustees of the bond funds have already challenged the initiative in court. They are: Seattle First National, Morgan Guaranty Trust Co. (NY), Continental Illinois National Bank and Trust Co.

April 19, 1982 BPA administrator Peter Johnson recommends to the WPPSS executive board that Unit 1 be deferred for 2 to 5 years. WPPSS executive board president Stanton H. Cain does not support the recommendation.

April 23, 1982 After the BPA rejection of 14 other options proposed by WPPSS, the WPPSS board unanimously votes to accept the BPA recommendation: Construction on Unit 1 is suspended for as long as 5 years. In the next several months, 6,000 people will lose their jobs,

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a WPPSS spokesman says. Eventually 15,000 jobs will be the cost of the decision in the tri-cities region.

April 1982 Unit 1 is 63 percent complete. Unit 2 is 90 percent complete. Unit 3 is 50 percent complete. This month's bond issue will carry the Unit 2 project to completion, says WPPSS and BPA. Unit 2 still needs an additional $566 million in financing. This may be the last bond issue if Initiative 394 is upheld—voters would be able to cut off funds on Unit 3 and never approve resumption of construction on Unit 1.

June 15, 1982 King County Superior Court Judge Robert M. Elston rules in pretrial deliberations that the contracts signed with Exxon are valid. The Unit 2 and Unit 3 contracts were signed in 1971 and 1973, respectively, each for 14 annual reloads beginning in 1979 and 1982. The main issue to be tried in February 1983 is whether Exxon Nuclear must accept payment as contracted or WPPSS should pay more because of schedule slippages and design changes (from 7X7 to 8X8). (See May 2, 1983.)

June 20, 1982 WPPSS rejects offers of $29 to $44 per pound U_3O_8 from four different uranium suppliers. Despite the litigation with Exxon, fabricators' bids are still being reviewed.

June 29, 1982 Initiative 394 is ruled unconstitutional by a federal district court in the state of Washington (Tacoma). However, the initiative is allowed to become law, pending appeal.

July 1982 WPPSS sells 289,000 DOE SWUs for 6/83 and 8/83 deliveries.

July 1982 Western Nuclear shuts down its uranium operation.

September 1982 In Eugene, Oregon, Judge George Woodrich rules that 11 public utilities from Oregon did not have the statutory power to sign "take or pay" agreements with WPPSS on Units 4 and 5 and are freed from any obligation to pay off the related bonds. Several similar law suits are pending in Washington State.

October 1982 Donald Rausch, president of Western Nuclear, claims a loss of $31 million because of court delays in a trial intended to determine damages stemming from a breached uranium contract with WPPSS.

October 8, 1982 Washington State Court Judge Joseph Coleman states in a summary judgment that 88 municipal utilities must pay interest and debt service on 2.25 billion in bonds on Units 4 and 5. This statement contradicts two earlier state court decisions in Oregon and Wyoming. The overall outcome still depends on the contract validity issue (see June 15, 1982).

November 1982 Eleven Washington Public utilities charging that the federal government coerced them into backing Units 4 and 5 are suing the U.S., the current BPA administrator (Peter Johnson), and the Energy Secretary (Donald Hodel) to pay their share of the debt as well as some legal costs incurring from the cancellation of the two units. The 11 utilities own one-third of the projects.

January 1983 The Ninth U.S. Circuit Court of Appeals upholds the decision by a Washington federal court that found Initiative 394 unconstitutional.

Feb. 17, 1983 Unit 1 is 63 percent complete. Unit 2 is 95 percent complete. Unit 3 is 70 percent complete.

Feb. 25, 1983 After a record-breaking completion rate of 2 percent per month, WPPSS decides to cut back to four workdays per week for Unit 3. WPPSS also votes deferral of purchases of any equipment not on the critical path. Unit 1 is already down to low activity with a work force of only 600.

Feb. 28, 1983 S&P lowers its ratings on Unit 4 and 5 bonds from B to CC.

March 1983 Because of the pervasive involvement of BPA, DOE's Oak Ridge Operations Office (ORO) decides to grant WPPSS a penalty-free schedule adjustment of 84-86 deliveries of 300,000 SWUs for up to 5 years for Unit 1.

April 19, 1983 A dozen of the 65 participants in Unit 4 and 5 agree to pay their share of the $30 million debt into an escrow account.

May 2, 1983 King County Superior Court Judge Robert Elston rules that the Exxon-WPPSS uranium contracts are enforceable at the initial prices regardless of the schedule slippage and design changes. This ruling would save WPPSS $350 million ($500 million estimated current value minus $150 million contract value).

May 1983 S&P suspends its ratings on Unit 1-3 bonds.

May 11, 1983 Moody's slashes its ratings on Unit 1-3 bonds from single-A-1 to Baa (3 notches).

May 12, 1983 Unit 2 is 96 percent complete and requires $150 million to be completed. Fuel loading, initially scheduled for February 1984, could be postponed by construction delays.

May 12, 1983 WPPSS sells 6,037 KgU as UF_6 (15,774 pounds U_3O_8 equivalent) from the Unit 5 inventory and 54,000 KgU as UF_6 from Unit 2.

May 12, 1983 The utilities have paid about $28 million into an escrow account but WPPSS does not have access to the funds. Currently, WPPSS has only about $31 million left in its account for the two units.

May 13, 1983 S&P suspends its AA rating on $6 billion of bonds issued for Units 1, 2, and 3.

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May 15, 1983 Many WPPSS bonds fall by as much as $170 to $180 for each $1000 face amount over three trading days as investors try to unload the bonds despite lack of buyers.

May 24, 1983 Judge Joseph Coleman of Washington State Superior Court in King County (Seattle) issues a temporary order preventing the bond trustee (Chemical Bank) from declaring Units 4 and 5 bonds in default.

May 26, 1983 Four investor owned utilities (see June 17, 1983) with part interest in Unit 3 state that financing should be arranged through banks to complete the unit. With a potential unilateral decision by WPPSS to freeze Unit 3, the four utilities might take legal action.

May 27, 1983 Following a firm recommendation from BPA, the WPPSS executive board votes to suspend work for 3 years on Unit 3 in 30 days if financing does not become available. Work will be at a slower rate until then. The project has only $90-91 million of the estimated $1 billion required to complete Unit 3.

May 27, 1983 Judge Joseph Coleman backs up his earlier ruling with a written order barring bond holders and their trustee from beginning default proceedings against WPPSS for missing interest payments until ruling is given on the utilities' obligations.

May 27, 1983 Unit 1 is 63 percent complete. Unit 2 is 96 percent complete. Unit 3 is 75 percent complete.

May 28, 1983 The WPPSS executive board votes to suspend work on Unit 3 for 3 years. The work force of 3000 will be reduced to a few hundred. This decision adds another $750 million to the 1983 projected cost of $4.9 billion.

May 31, 1983 Unable to make use of funds paid into an escrow account by the 88 utility participants who backed Units 4 and 5, WPPSS misses the $15.6 million monthly interest payment to New York City's Chemical Bank, the bond trustee.

June 1, 1983 Moody's suspends its ratings on $6 billion of bonds for Units 1-3 and assigns its Caa rating ("of poor standing") to the projects for Unit 4 and Unit 5.

June 3, 1983 The four investor-owned utilities (see June 17, 1983) convince WPPSS to try to put together a financing plan to forestall the suspension of construction on Unit 3.

June 6, 1983 The four investor-owned utilities present their plan to WPPSS for financing Unit 3.

June 9, 1983 The WPPSS financial officer proposes that the agency seek $960 million in commercial bank financing to prevent a three-year hold on Unit 3. The proposal is not eagerly received by BPA, which would have to guarantee such loans.

June 10, 1983 Unit 1 is 63 percent complete. Unit 2 is 97 percent complete. Unit 3 is 75 percent complete and about $1 billion is required for completion.

June 15, 1983 In a surprising decision, the Washington Supreme Court rules by a 7-2 vote that 28 Washington municipal utilities that signed "take or pay" agreements with WPPSS on Units 4 and 5 did not have the statutory power to do so and have no obligation to pay off the bonds. Even if the utilities had to pay off the bonds, Washington electricity rates would still be well below the national average because of the low cost of hydroelectric power.

June 15, 1983 The big losers in the June 15 ruling are 487 insurers who held $1.85 billion of the bonds by end of 1982. In approximate order, the major ones are: State Farm, American Express, Crum and Forster, Fireman's Fund, Continental Insurance, Hartford Insurance, U.S. Fidelity & Guaranty, Aetna Life and Casualty, Kemper Insurance, CIGNA, CNA. However, their combined assets exceed their liability by more than $60 billion, dwarfing the WPPSS holdings.

June 15, 1983 Leaders of the Principal underwriting groups for the WPPSS bond issues, Merrill Lynch ($785 million), Smith Barney, Harris Upham & Co. ($645 million), and Phibro-Salomon Brothers Inc. ($530 million) are already being charged with fraud and negligence in several law suits.

June 15, 1983 Bonds for Units 1, 2, and 3 fall about 4 points. Bonds for Units 4 and 5 fall more than 14 points.

June 17, 1983 S&P suspends the credit ratings of Pacific Power and Light (BBB), Portland General Electric (BBB–), Puget Sound Power and Light (BBB), and Washington Water Power (BBB+). The four own 30 percent of Unit 3 and would suffer if it is not completed.

July 5, 1983 Judge Joseph Coleman refuses to lift his temporary restraining order that has prevented Chemical Bank from declaring WPPSS in default.

July 21, 1983 Senator James McClure (R-Idaho) introduces a senate provision to be added to fiscal 1984 appropriations for the Interior Department. The amendment would create a new entity to issue $1 billion in bonds backed by BPA for the completion of Units 2 and 3, respectively 98 and 75 percent complete. However, the legislative provision never goes through an authorizing committee in either the Senate or the House. Major opponents: Senator Howard Metzenbaum (D-Ohio), Senator William Proxmire (D-Wis.), and Senator Henry Jackson (D-Wash.).

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ANALYSIS & COMMENTARY

July 22, 1983 WPPSS admits in court that interest payments on Unit 4 and 5 bonds will not be made, thus waiving a 90-day period beyond payment due date and allowing Chemical Bank to declare WPPSS in default.

July 25, 1983 Chemical Bank issues a notice of event, which would normally place WPPSS in default 90 days after receipt, for not paying its debts on Unit 4 and 5 bonds. Because of the July 22 statements, WPPSS is declared in default.

July 25, 1983 WPPSS transfers to Chemical Bank about $25.7 million of cash and securities. Although more than $2 billion was poured into the cancelled plants, only $500 million of the assets are salable. WPPSS says that Chemical Bank is now the owner of Units 4 and 5. WPPSS has $8 billion in bonds outstanding but is defaulting on only $2.25 billion of its bonds.

July 26, 1983 Unit 2 is 98 percent complete.

July 1983 After a quick and quiet approval in the Senate as a rider to an appropriations bill, the financing plan to rescue Units 1-3 is running into stiff opposition in the House of Representatives. Rep. George Hansen (R-Ida.) presented the bill. The subcommittee chairmen involved, Reps. Richard Ottinger (D-NY) and Jim Weaver (R-Ore.), are against the bill.

August 1, 1983 WPPSS and BPA are sued by 3 utilities (Puget Sound Power and Light, Washington Water Power, Portland General Electric) over the suspension of Unit 3. The suits ask that WPPSS and BPA adhere to the construction schedule under the ownership agreement.

August 3, 1983 The US Senate becomes deadlocked on the rescue measure that would allow WPPSS to raise construction funds to complete Units 2 and 3, and the dispute leads to postponement of consideration for the Interior funding bill ($7.6 billion) until after the August recess.

August 4, 1983 Chemical Bank, charging fraud and negligence, sues WPPSS, 23 municipalities represented by the WPPSS executive board, 88 utilities on the owners' committee, the Bonneville Power Administration, and more than 500 individuals who participated in the bond sales for Units 4 and 5. No underwriters of the bonds are named in the suit.

August 4, 1983 WPPSS is now involved in more than 60 law suits. Last year, WPPSS paid $15.5 million in legal costs, including $2.2 million for Chemical Bank's lawyer. (Since the default, WPPSS no longer pays for Chemical Bank's lawyer.)

August 1983 If WPPSS succeeds in selling parts of Units 4 and 5, it probably will not get more than 10 cents for every dollar spent because of a glut of nuclear power plant parts on the market.

August 1983 Out of the $2.25 billion from the defaulted bonds, more than half ($1.2 billion) went for debt service. WPPSS paid $44 million each for two steam turbines still in a warehouse in Lancaster, Pa. Last year it cost WPPSS $44,600 to store the turbines. Two steam generator vessels costing a total of 203.5 million will probably wind up as scrap because of their complexity and size. At one site, WPPSS built an $8.3 million road to support the transport of heavy equipment. (For other expenditures, see 1977 and August 4, 1983.)

August 9, 1983 A Washington State Judge dismisses a lawsuit by Chemical Bank, freeing 28 northwest municipal utilities and one privately owned utility from paying their share of the $2.25 billion in bond debt for the cancelled units (4 and 5).

August 15, 1983 Western Nuclear wants to seize WPPSS UF_6 to satisfy its $53.6 million damage award. There is a restraining order from the Court of Appeals in San Francisco preventing WPPSS from moving the UF_6 until the court decides whether Western Nuclear can attach assets.

August 15, 1983 The litigation before a US Judge in Tulsa is more complex because Kerr McGee wants the court to rule that Western Nuclear cannot seize the UF_6 until Kerr McGee is paid $4.6 million it is claiming for conversion.

August 15, 1983 The WPPSS antitrust claim that Western Nuclear and 10 other suppliers conspired to fix uranium prices is still pending before Judge Walter McGovern of the U.S. District Court in Seattle. The trial is scheduled to start in September.

August 25, 1983 WPPSS announces that, following the default, S&P has downgraded WPPSS bonds issued for the construction of Units 4 and 5 from double -C to D, S&P's lowest rating.

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AUSTRALIA'S POTENTIAL AS A URANIUM-PRODUCING NATION

Introduction

A nationwide survey recently discovered that approximately two-thirds of Australians 14 years and over think Australia should develop and export its uranium for peaceful purposes, despite their natural concern over safety and the proliferation of nuclear weapons. Furthermore, 59 percent of Australian Labor Party (ALP) voters favor uranium mining and export, while only 26 percent of Australians support full implementation of the ALP party platform calling for a "phasing out" of the uranium industry.

Surveys such as this, although without direct influence, can become significant agents of change when a government is wrestling with policy decisions. Apart from the commercial and economic impracticalities of the policy, the poll indicates that the Australian government's policy runs counter to current public opinion. Australian uranium miners are convinced that the government will heed these figures in the current review of its uranium policy, especially in light of the fact that Australia contains fully 20 percent of the Free World's uranium resources. The miners hope that, despite the disappointing history of ALP decision-making on the uranium question, the current review will lead to a more mature appreciation of Australia's important role and potential influence in the international fuel cycle.

Uranium Resources

According to estimates by the Australian Atomic Energy Commission (AAEC), Australian resources in the Reasonably Assured category (RAR) recoverable at a cost of less than US$30/lb. U_3O_8 amount to 370,000 tonnes U_3O_8, representing 20 percent of the Western World's reserves. Australia's share of Estimated Additional Resources (EAR) is even greater. This category has been assessed to contain 435,000 tonnes U_3O_8, 25 percent of the Western World's resources. In addition, the AAEC estimates that Australia is endowed with Speculative Resources amounting to 3.1 million tonnes U_3O_8 (at 75 percent probability) or more than 4.6 million tonnes U_3O_8 (at 50 percent probability).

Operating Production Centers

Australia's two production centers, Nabarlek and Ranger, have been operating for more than two years. Figure 1 shows their locations in the Northern Territory. Total Australian production in 1982 amounted to 11.7 million pounds U_3O_8, including 1.9 million pounds U_3O_8 from Mary Kathleen Uranium (MKU), which ceased production in September 1982. Production for 1983 will amount to approximately 10.5 million pounds U_3O_8.

Nabarlek is the most compact, low-cost project in the world. Its orebody contained more than 26 million pounds U_3O_8 in such small quantity of rock that mining was completed in six months. Uranium processing now proceeds from an ore stockpile adjacent to the mill.

The owner, Queensland Mines Ltd. (QML), is a wholly-owned subsidiary of Pioneer Concrete Services, Ltd. (part of The Pioneer Group, an Australian conglomerate having annual revenues of $1.5 billion). The Nabarlek mill was designed to produce 3.3 million pounds U_3O_8 per year, but has frequently exceeded that rate.

QML has sold all of its future production, except for approximately 6 million pounds U_3O_8. QML's six long-term contracts are divided between European and Japanese utilities. At current production rates, QML adds approximately 800,000 pounds per year to its U_3O_8 stockpile. The company desires diversification into the US market, but has been frustrated by the Australian government's unfavorable policies. In the long term QML hopes to develop (for subsequent mining) additional resources from the 140 uranium anomalies it has discovered in the vicinity of Nabarlek.

In a politically-inspired move, the Australian government announced the suspension of uranium shipments to France as a protest against French weapons tests in the Pacific Ocean. The next shipment under the contract with Electricite de France, however, is not due until October 1984. It is the consensus in Australia that the political threat will not be carried out; to do so would carry prohibitive risks for other aspects of Australia's international trade. (Report 178)

The **Ranger** mine and milling operation is the flagship of the Australian uranium industry. Until Canada's Key Lake project reaches full capacity production, expected later this year, Ranger's annual uranium output will remain second only to that of Rossing. Ranger is owned by Energy Resources of Australia (ERA), a public company specially incorporated for this purpose (Report 150). ERA estimates that Ranger's annual capacity could be increased from 6.6 million to approximately 10 million pounds U_3O_8 at a cost of approximately $60 million. If so, Ranger's reserves of approximately 100,000 tonnes U_3O_8 (52,200 tonnes proven, 58,600 tonnes probable) would give the mine a remaining life of at least 20 years.

In order to ease consumer concern over the long

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transport distances from Australia, ERA has adopted a policy of shipping uranium ahead of schedule and storing it for the customer free of charge at nominated facilities. ERA holds sales contracts for just over 90 percent of present capacity to 1996. Currently producing in excess of its obligations, ERA is seeking US contracts under negotiating licenses issued by the present government, but is, of course, subject to the same problems facing QML.

The Company has managed its industrial relations well and enjoys the support of the unions concerned. Because of its important status as an employer and earner of export income, ERA feels assured of government support. Yet the company is somewhat anxious to see the outcome of the present policy review for two reasons.

1. Unless the government settles the administrative arrangements under the bilateral agreement with the Republic of Korea, this year's shipment under the contract with Korea Electric Power Company (KEPCO) might be frustrated.

2. The company is eager to maintain its market leaderhip, but can only do so if its current marketing efforts, mainly in the USA, are successful and find government approval (prerequisites for an expansion of capacity).

Although the total direct employment at Nabarlek and Ranger combined is less than 600, a significant part of the Northern Territory economy draws its impetus from these two producers. The local population, including the Aboriginal groups, seems to be quite solidly in favor of an expanded uranium industry in the Northern Territory. Ultimately, the government will be hard put to ignore this potential for economic growth in an otherwise under-employed region.

Production Potential

Jabiluka near the Ranger mine and Yeelirrie in Western Australia (Figure 1) are the projects under development that are technically most advanced. **Honeymoon** in South Australia and **Lakeway** near Yeelirrie had attained "approved project" status before the government changed from Liberal to Labor in March 1983. However, in the light of the ALP platform and the government's inaction, the activities on all projects have been reduced to the minimum, with the exception of the **Olympic Dam** (Roxby Downs) project in South Australia, on which a $150 million feasibility study is proceeding.

Jabiluka's development depends, quite aside from government policy, on market demand sufficient to provide a base load for development of the 200,000 tonnes U_3O_8 contained in the deposit. Although they plan a mill of approximately 10 million pounds annual capacity, the project partners believe that the likely starting capacity will be closer to 6.6 million pounds U_3O_8 per year.

Pancontinental Mining (65 percent owner) entered into a commercial understanding with the CEGB (Central Electricity Generating Board) of the UK for the delivery of approximately 4.4 million pounds U_3O_8 from 1988 to 1998. However, the previous Australian government (Liberal) found the pricing provisions of the proposed contract inconsistent with policy objectives and refused to approve the terms. Absent government policy supporting uranium mining, as distinct from merely tolerating it, the Jabiluka partners will find it difficult to present the project as a future supplier in the marketplace.

The **Yeelirrie** project suffered a major setback when Esso, Western Mining Company's partner in the joint venture, disengaged itself from uranium mining. Since then, WMC attempts to fill the vacancy have failed. The Yeelirrie project, like others which under the previous government had received approval to seek markets, lost its negotiating licenses when the Labor Government came to power. In the process of seeking new project partners, a WMC analysis found that the project would be viable at an annual capacity of 5.5 million pounds U_3O_8. If Yeelirrie were to proceed on this basis, the life of the higher-grade portion of its shallow ore body would be extended, the total capital cost reduced and the entry barrier lowered in terms of the base load tonnage required, relative to the target annual capacity of 10 million pounds U_3O_8 once considered. WMC has stated that without the reinstatement of its negotiating licenses, it will have no choice but to shelve the project.

The **Koongarra** deposit, originally discovered by Noranda, was acquired in 1980 by Denison. It contains approximately 13,000 tonnes U_3O_8. Plans exist for the production of approximately 2.5 million pounds per year. Denison encountered numerous delays in its negotiations with Aboriginal groups who hold traditional land rights over the area. In July of this year, Denison achieved a breakthrough when the Aboriginal community swung its support behind the project. The traditional owners have informed the federal government of their preference for the project to proceed. The agreement with Denison includes, in addition to the usual royalty provisions, the right of the Aboriginal community to acquire 25 percent of the project equity. The arrangements, which are kept

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confidential, may include provisions for Denison to assist the Aboriginals financially in the acquisition. In any event, Denison must divest itself of 75 percent of the equity in order to meet foreign investment guidelines. The 25 percent destined for Aboriginal equity holders represents a promising start.

Denison's move has strategic merits in that it tests the government's integrity regarding its support of this socially vulnerable minority and its rights to self-determination. The company believes that production could begin within two to three years from the time the government grants approval. Considering the political processes involved, this time frame seems somewhat optimistic, as the company still must enter into sufficient export contracts before it can finance the project and place the remaining 50 percent of the equity (by the time of production startup) in Australian hands.

The **Honeymoon** project, owned 25.5 percent by CSR, 25.5 percent by Teton Exploration Drilling Co., and 49 percent by MIM, is located in South Australia. Upon the completion of a semi-commercial pilot plant, designed to use the in-situ leach extraction technique, the state government (ALP) refused to grant the necessary mining permit. The state government based its decision on the ALP platform that calls for a moratorium on uranium projects and, *supposedly*, on environmental grounds. Even though the project had already obtained the requisite environmental clearances, South Australia's government has rejected the project owners' claim for compensation from the state.

Beverley, also located in South Australia, is in a similar situation. When the state government refused the operating license to Honeymoon, it also denied a pilot plant operating license for the Beverley project before the owners' joint venture company, South Australian Uranium Corporation, even applied for one. SAUC, owned 50 percent by Western Nuclear Ltd. (USA) and 50 percent by a group of three equal partners (Oilmin, Petromin, and Trans Oil), has meanwhile applied for a permit to construct a small experimental in-situ extraction facility but has received no response from the state government. SAUC has yet to complete its final environmental impact statement.

Olympic Dam—The Olympic Dam project joint venture partners, WMC and BP (British Petroleum, Ltd.), have agreed on the metallurgical extraction processes which the $18 million pilot plant will be testing once its construction is completed. The ore treatment process will encompass milling, flotation, acid leaching of the uranium-bearing portion and, for the production of metallic copper, also smelting. Underground evaluation is continuing at a high rate.

Upon the commencement of construction activities, local Aboriginal groups have registered their opposition, claiming that a proposed access road will encroach upon some sacred sites. They have demanded the diversion of the road and have blocked its construction by setting up camp on the alignment. According to the company, a diversion would be costly and unsound from an environmental and engineering standpoint. During two years of extensive anthropological studies, the existence of the alleged sites was not revealed. WMC, which manages the project, faces an impasse, but is confident it will find an acceptable solution.

Although no definitive production plans have been announced, preliminary estimates suggest that the project could yield 150,000 tonnes of copper and 6.6 million pounds U_3O_8 per year. The viability of the Olympic Dam project is more dependent on the demand for copper than on the market for uranium. However, in a co-product operation, a market for the predominant metal alone does not ensure success. Like the other Australian projects, Olympic Dam awaits clarification of the federal government position, but probably with more equanimity than the others. There is far less political controversy over Olympic Dam than any other project. It has been recognized by both state and federal governments as a significant economic stimulant. In addition, the fact that uranium is secondary to copper shields the project somewhat from criticism associated with concern about nuclear weapons. Thus, the project is unlikely to fail for lack of political acceptance.

Union Attitudes

The unions, in accordance with the ALP policy, have officially opposed the mining and export of uranium, at least until the existence of what they regard as adequate safeguards and means of waste disposal. In practice, however, unions have sought and have obtained employment rights through the industrial courts in the uranium production centers at Nabarlek and Ranger. Unions have been orderly in fulfilling their contracts, both to produce uranium at the mines and to load it at the wharves. No production losses or delivery delays have occurred because of union action motivated by opposition to uranium mining.

Unions in Australia are diverse in character and range from local independent associations to large national or-

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ganizations. There is a preponderance of small unions: 75 percent have fewer than 5,000 members, covering only 8 percent of the nation's total union membership. This pattern is based on traditional craft unions which have contributed much to the incidence of stoppages because of inter-union jurisdictional disputes. The trade unions are organized in national confederations, of which the largest is the Australian Council of Trade Unions (ACTU). The ACTU holds an official uranium policy which is little different from that of the ALP, but its policy is not binding on individual member organizations.

Unions have discovered that in order to survive, they need highly professional and well-paid representatives, which the smaller unions cannot afford. Therefore, small unions are often forced into amalgamations. A new type of union representative is emerging, more enlightened and more compatible with the business executive. This development might very well improve labor relations throughout Australia. The uranium industry is fortunate that the majority of its workforce is associated with one of the larger unions, the leadership of which has taken a favorable attitude to uranium mining and export.

Non-proliferation Safeguards

The Australian policy on international safeguards was made public in 1977. It states that Australia is not willing to supply uranium to all countries with nuclear reactors. For all countries other than the five nuclear powers (weapons states) recognized by the Non-Proliferation Treaty (NPT), sales are only considered to countries which are parties to the NPT. As for the weapons states, Australia will supply only to those that give an assurance that any uranium they receive will be covered by IAEA safeguards. In addition, Australia requires the conclusion of a bilateral agreement with the country wishing to import Australian uranium. Bilateral agreements specify that Australian uranium and nuclear materials derived therefrom will be used for peaceful purposes and will not be diverted to military use. Australia has signed bilateral agreements with nine Eratom member states: Canada, Finland, France, Japan, Republic of Korea, Philippines, Sweden, the UK, and the USA. The new government has ordered a review of Australia's international safeguards arrangements in parallel with the overall policy review it is conducting. The safeguards review will assess how well the bilateral system has performed to date. The completion date for the report to the Cabinet is probably one month away.

Conclusion

Australia has the potential to become one of the world's largest uranium producing nations. However, lack of support from successive Liberal and Labor governments has slowed the development of new mines and mills much more than expected by the market. Yet, once committed, construction of Nabarlek and Ranger progressed rapidly. Both projects were completed on time and within budget. Commissioning and production start-up were equally successful.

Uranium shipments to date have met schedules despite initial union trouble at the Darwin wharf. Australian facilities are built to high technical standards and their operations are as efficient as any in the world. Both operating projects are financially sound and have paid dividends to their shareholders from the first year of operation. Most of their production is committed for 10 years or more. Australia has an established record of performance as an exporter of a wide range of mineral products.

The following factors are important to a consumer's assessment of Australia as a potential supplier.

1. Political events have slowed development of the country's uranium resources, particularly with respect to the growth of production capacity. The performance of the Australian government on the uranium question has generally fallen short of the degree of commitment needed for growth.
2. During the past ten years, uranium miners and government administrators have developed well-tested, cooperative ways of working together.
3. If Australia is ever to realize its potential as a uranium supplier, the development of a larger market for Australian uranium will be crucial.
4. Three examples (Mary Kathleen, Ranger and Nabarlek) have demonstrated what the Australian uranium industry can do once political obstacles are overcome.

When the Fox Commission examined the cost of delaying Australian uranium exports, it labored under a fundamental misconception which derived from an oversimplification of economic theory, the assumption that markets are always available. In practice, buyers who would have liked to diversify supply sources between 1976-80 by purchasing Australian uranium turned to other sources, probably at higher prices. African, Canadian and South African producers have increased their market share at Australia's expense.

Undoubtedly, Australia's delayed market entry reduced considerably the potential for uranium sales. Sales lost in such a fashion are not easily regained. Neither are the export revenues, the employment opportunities and

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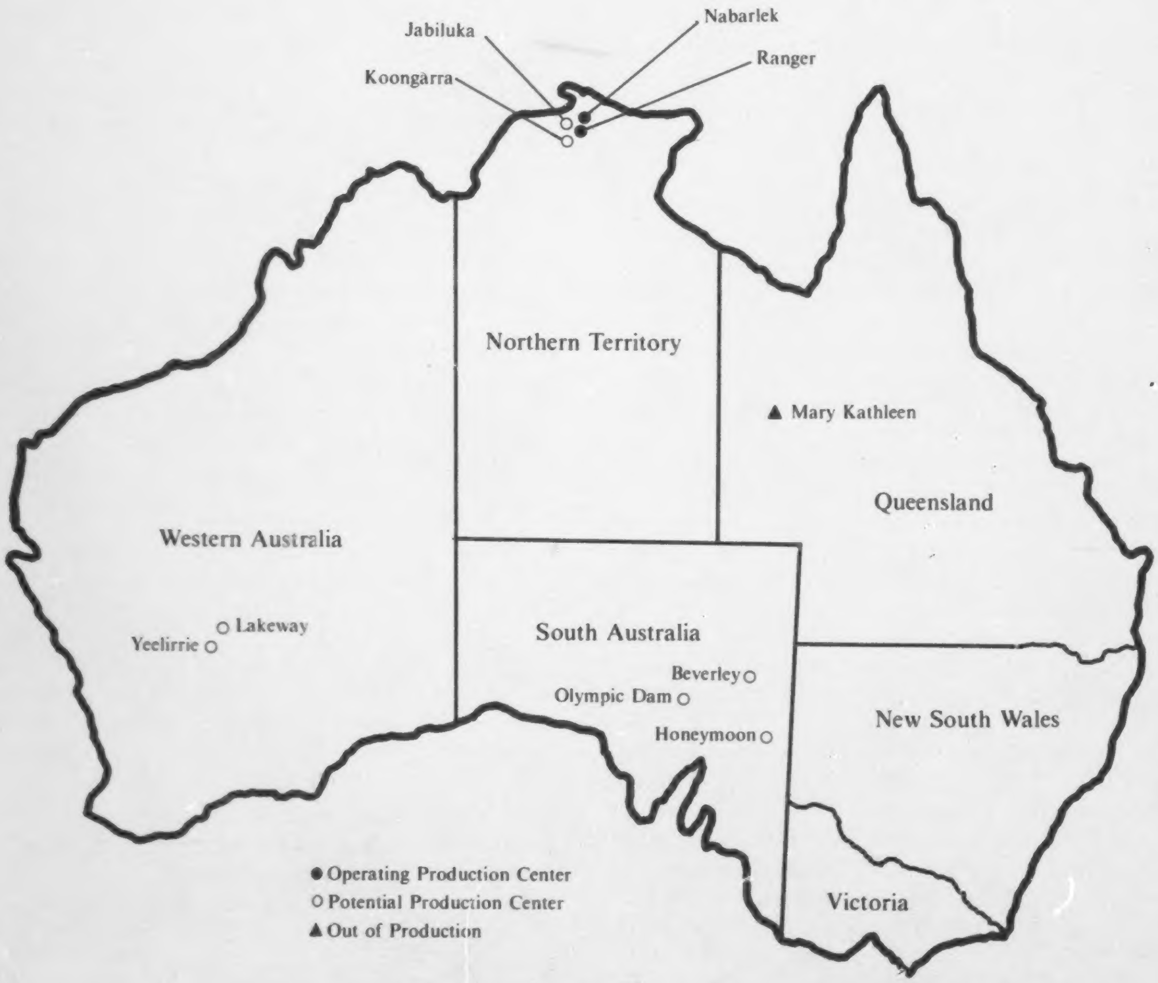
the international standing in the marketplace. One estimate placed the cost of the five-year delay at more than one billion dollars (in 1980 dollars).

Although it is futile to dwell on what might have been, there is merit in learning from the past in order to avoid costly procrastination in the future. Even the diminished market potential that may remain available to Australia during the remainder of this decade cannot be translated into sales without a serious government commitment. The industry hopes that the government will adopt a policy more favorable to uranium development and more consistent with Australia's resources and technical capabilities. With unions largely on the side of development and a solid 66 percent majority in favor of uranium mining, Australia stands a reasonable chance of outgrowing the image of a "supplier of last resort" and of becoming a significant and reliable supplier.

Figure 1

Australia: Selected Uranium Projects


Jabiluka
Nabarlek
Ranger
Koongarra
Northern Territory
Mary Kathleen
Queensland
Western Australia
Lakeway
Yeelirrie
South Australia
Beverley
Olympic Dam
Honeymoon
New South Wales
Victoria
● Operating Production Center
○ Potential Production Center
▲ Out of Production

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URANIUM CONSUMPTION AND PRODUCTION IN CANADA

Introduction

Canada's nuclear power and uranium industries share a number of characteristics with those of other industrialized nations.

1. Nuclear power has not met the growth forecasts of a decade ago; nor has it turned out to be as economical as optimists predicted.
2. Ratepayers and politicians are publicly challenging existing utility supply contracts and plant construction programs on environmental as well as economic grounds.
3. Higher cost producers unable to replace cancelled or expired contracts have closed down operations completely.
4. Lower cost suppliers are competing aggressively and successfully for long-term contracts.
5. The federal government has enacted marketing policies to protect the domestic Canadian industries.

Nuclear Power

In the early 1970s, nuclear power was viewed in eastern Canada as it was in other industrialized nations, as the principal future source of baseload electrical power. Utilities planned nuclear power plants to meet the steady growth in demand for electricity that they anticipated.

Although Canada's nuclear industry has suffered along with those of other Western nations from subsequent reductions in planned capacity, the curtailment of plans has not been as drastic as in many other countries. Figure 2 shows the locations of Canada's nuclear reactors and uranium production centers.

Two new nuclear power plants became operational in early 1983—Hydro Quebec's Gentilly Unit 2 and New Brunswick's Pt. Lepreau. While these are the only units that these utilities have planned, Ontario Hydro has eleven units under construction to supplement ten that are currently operating commercially. Table 2 lists the eleven units that are now being built and their scheduled commercial operation dates.

The combined capacity of New Brunswick and Hydro Quebec nuclear units is 1,268 MWe; adding Ontario Hydro's nuclear capacity of 4,711 MWe yields a total of 5,979 MWe for Canada's current installed nuclear generating capacity. By 1992, the 8,072 MWe now under construction will have increased Canada's total commercial capacity to 14,051 MWe. This translates to a growth in uranium consumption from 2.7 million pounds U_3O_8 in 1983 to approximately 4 million pounds annually by 1992. Projected uranium consumption is shown in Table 6.

Table 2

ONTARIO HYDRO NUCLEAR UNITS UNDER CONSTRUCTION

Unit	MWe (net)	Commercial Operation Date
Bruce 5	750	July 1984
Bruce 6	750	April 1984
Bruce 7	750	April 1986
Bruce 8	750	January 1987
Pickering 6	516	April 1984
Pickering 7	516	September 1984
Pickering 8	516	September 1985
Darlington 1	881	February 1989
Darlington 2	881	May 1988
Darlington 3	881	November 1991
Darlington 4	881	August 1992
TOTAL	8,072	

Production

In 1982, Canada produced approximately 21 million pounds U_3O_8, an increase of almost 5 percent over its 1981 production of approximately 20 million pounds. Production in 1983 is expected to hold steady, with both Key Lake (Saskatchewan Mining Development Corporation (SMDC), Uranerz Canada, and Eldorado Nuclear) and the reactivated Stanleigh mine at Elliot Lake (Rio Algom, Ltd.) adding production in the second half of the year. Key Lake will produce appoximately 2 million pounds by year end; first yellowcake shipments are scheduled for November. Stanleigh, which has been reactivated since July 1, is producing at a rate of roughly 1.8 million pounds U_3O_8 per year.

Nuexco estimates that Canadian uranium production will grow 50 percent, from 21 million pounds U_3O_8 this year to approximately 32 million pounds U_3O_8 annually by 1987. This growth, by province, is shown in Table 3.

Contracts

The active Canadian uranium companies are: AMOK; Denison Mines; Eldorado Nuclear; Rio Algom, Ltd.; SMDC; and Uranerz Canada. AMOK, operator and 80 percent owner of Cluff Lake, is a subsidiary of three French companies (30 percent CEA, 25 percent Compagnie de Mokta, and 45 percent Pechiney Ugine Kuhlman). AMOK is a *captive producer* in that all of the

Table 3

PROJECTED CANADIAN URANIUM PRODUCTION
(millions of pounds U_3O_8)

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Saskatchewan	9.0	12.8	20.0	19.5	20.0	20.0	20.0	20.0	20.0
Ontario	11.9	12.1	12.1	11.9	11.9	11.9	11.9	11.9	11.6
TOTAL CANADA	20.9	24.9	32.1	31.4	31.9	31.9	31.9	31.9	31.6

Table 4

RIO ALGOM, LTD. & DENISON MINES PUBLICLY KNOWN CONTRACTS
(thousands of pounds U_3O_8)

Buyer	1983	1984	1985	1986	1987	1988	1989	1990	1991
Denison Commitments									
Ontario Hydro	847	1600	1600	2000	2000	2000	2000	2000	2000
Tokyo EPCo. (Japan)	4230	3380	3380	3380	3380	3380	3380	3380	3380
Rio Algom Commitments									
Duke Power (USA)	1500	1500	1500	2000	2000	2000	2000	2000	2000
Westinghouse (USA)	1000	0	0	0	0	0	0	0	0
Ontario Hydro	1000	1700	1700	1700	1700	1700	1700	1700	1400

Table 5

SMDC, ELDORADO NUCLEAR & URANERZ CANADA PUBLICLY KNOWN CONTRACTS
(thousands of pounds U_3O_8)

Buyer	1983	1984	1985	1986	1987	1988	1989	1990	1991
El Dorado Nuclear Commitments									
Hokuriku (Japan)	400	400	400	0	0	0	0	0	0
Public Service E&G (USA)	175	175	175	175	175	175	175	175	
Ontario Hydro	0	0	528	528	528	528	616	616	61
Ontario Hydro	700	600	600	0	0	0	0	0	0
SMDC Commitments									
Commonwealth Ed. (USA)	1000	1000	1000	1000	0	0	0	0	0
Kansas G&E (USA)	0	0	0	0	200	200	200	200	200
Philadelphia Electric (USA)	0	100	100	100	100	100	100	100	100
SSPB (Sweden)	325	325	325	325	325	325	325	325	0
Sydkraft (Sweden)	325	325	325	325	325	325	325	325	0
Yankee Group (USA)	0	0	200	400	400	400	400	400	400
Uranerz Canada Commitments									
Florida Power (USA)	0	0	200	200	200	200	200	0	0
Ontario Hydro	0	0	900	900	900	900	900	90	900
RWE (Germany)	0	0	0	900	900	900	900	900	900
Synatom (Belgium)	289	289	289	289	289	289	289	289	289

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company's uranium production is dedicated to two customers.

Rio Algom's Stanleigh mine is also a captive producer; its output is dedicated to Ontario Hydro. Rio Algom production from its Panel and Quirke mills is committed to utilities in the USA, UK, Japan, Germany, and Canada. Denison Mines supplies a Japanese utility and Ontario Hydro.

A summary of Rio Algom and Denison publicly known supply contracts is shown in Table 4. Annual amounts are estimates based on published sources.

The three sellers aggressively seeking uranium supply contracts are the Key Lake Mining Company (KLMC) partners: SMDC, Uranerz Canada, and Eldorado Nuclear. In addition to Key Lake uranium, SMDC seeks buyers for material it will receive from AMOK as its 20 percent share of Cluff Lake output, and El Dorado for its Rabbit Lake/Collins Bay output. A summary of the publicly known supply contracts completed by these three companies is shown in Table 5. Annual amounts are estimates based on published sources.

Government Policies

In the early to mid-1970s, various Canadian government policies and guidelines were adopted in anticipation of future Canadian uranium and nuclear industry needs. They included the following provisions.

1. A designated percentage of resources is to be reserved for Canadian domestic use.
2. Export contracts are to be written for no longer than ten years; five year extensions are to be allowed, subject to "recall".
3. Contracts for export of uranium are required to have provisions for an escalating floor price and annual price negotiations.
4. Exported uranium is to be in the form of natural UF_6 rather than U_3O_8 as long as Canadian conversion capacity is available and generally competitive.

The government is now reviewing these policies and is expected to revise them by the end of this year. Presumably, the revision will take into account changes that have taken place in the market since the policies were established. For example, the well-publicized uranium supply excesses expected in the 1990s by Ontario Hydro, together with the enormous Saskatchewan finds, render unnecessary the policy of holding a specific percentage of uranium as reserves for Canadian usage. The lifting of this policy would allow more uranium to be contracted for export well into the next decade. Furthermore, the prospect, however remote, that material previously committed might be "recalled" could make Canadian producers seem unreliable to potential foreign customers.

The uranium upgrading requirement is currently the most controversial of the Canadian government's uranium export policies. In 1981 a US utility spokesman was quoted as saying that the domestic conversion requirement "really gets down to price" and is "not so bothersome if the price of conversion is good." However, the upgrading requirement may still prove counter-productive because many potential customers are committed to long-term conversion contracts outside of Canada.

The market will be the judge of the success of the present enforcement of Canada's uranium upgrading policy. As in the past, US buyers will find a way to handle their unwanted conversion contracts if Canadian yellowcake and conversion prices are the best available. Otherwise, the Canadian government may choose to accommodate the market much as it did in 1982, when it allowed specific contracts to be finalized without the upgrading requirement.

Conclusion

Beginning in 1985, Canadian producers will have available for sale an approximate annual average of up to ten million pounds equivalent U_3O_8 per year. That figure is derived from the analysis shown in Table 6. The analysis subtracts Nuexco's estimates of Canadian exports currently under contract and domestic uranium consumption from Nuexco's forecast of Canadian uranium production. The result, designated in Table 6 as the balance, is equivalent to the algebraic sum of annual uncommitted production and annual change in inventory. For example, Table 6 indicates a balance of 12.9 million pounds U_3O_8 in 1991; if 5 million pounds were already committed to scheduled increases in domestic utility inventories, 1991 uncommitted production would be 7.9 million pounds. That would not mean that, in 1991, Canadian producers would be offering 7.9 million pounds for delivery. Rather, it woud mean that at various times in the next eight years Canadian producers would be offering for sale a total of 7.9 million pounds for *delivery* in 1991 (assuming producers wished to hold no material in inventory). Canadian production is largely committed for 1983 and 1984.

The balance figure derived in Table 6 for 1983 is *minus* 1.7. A negative result for the balance figure implies that a portion of exports or consumption will be supplied from inventory. In this case, Nuexco's estimate of Canada's 1983 beginning inventory is approximately 6 million pounds U_3O_8 equivalent, so without additional sales for 1983 delivery, approximately 4 million pounds will re-

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Table 6

CANADA: URANIUM CONSUMPTION AND PRODUCTION BALANCE
(Millions of Pounds U_3O_8)

	1983	1984	1985	1986	1987	1988	1989	1990	1991
PRODUCTION[1]	20.9	24.9	32.1	31.4	31.9	31.9	31.9	31.9	31.6
less CONSUMPTION[2]	2.8	31.	3.0	3.3	3.5	3.8	3.5	4.1	4.0
less EXPORTSD[3]	19.8	18.6	19.1	18.5	17.0	17.0	17.1	16.7	14.7
equals BALANCE[4]	(1.7)	3.2	1.0	9.6	11.4	11.1	11.3	11.1	12.9

[1] This Report, Table 2.

[2] Nuexco estimate of contracts already in place.

[3] Nuexco estimate.

[4] The algebraic sum of annual uncommitted production and annual change in inventory.

main in inventory as of the beginning of 1984. The derived balance for 1984 is 3.2 million pounds equivalent U_3O_8. The cumulative sum of the annual balance figures derived in Table 6 amounts to almost 80 million pounds U_3O_8 equivalent. In Nuexco's opinion, the resolution of a supply overhang of that magnitude will require a combination of the following mechanisms:

1. Additional export sales, either from presently uncommitted production or from future accumulations of utility inventory;
2. Utility inventory increases beyond those already scheduled under current contracts;
3. Production cutbacks or shutdowns.

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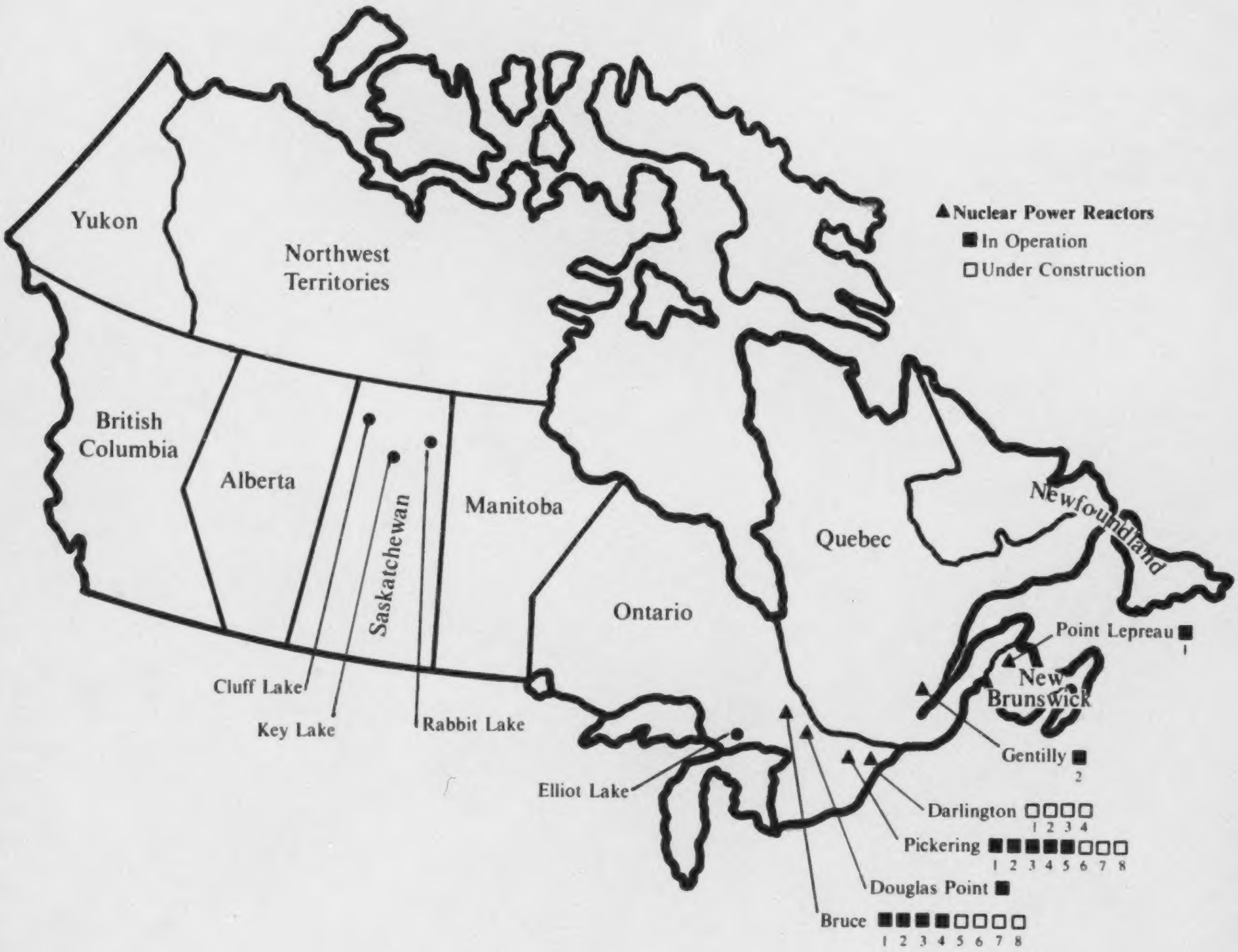
Figure 2

Canada: Reactors and Production Centers


▲Nuclear Power Reactors
■ In Operation
☐ Under Construction
Yukon
Northwest Territories
British Columbia
Alberta
Saskatchewan
Manitoba
Ontario
Quebec
Newfoundland
New Brunswick
Cluff Lake
Key Lake
Rabbit Lake
Elliot Lake
Point Lepreau ■ 1
Gentilly ■ 2
Darlington ☐☐☐☐ 1 2 3 4
Pickering ■■■■■☐☐☐ 1 2 3 4 5 6 7 8
Douglas Point ■
Bruce ■■■■☐☐☐☐ 1 2 3 4 5 6 7 8

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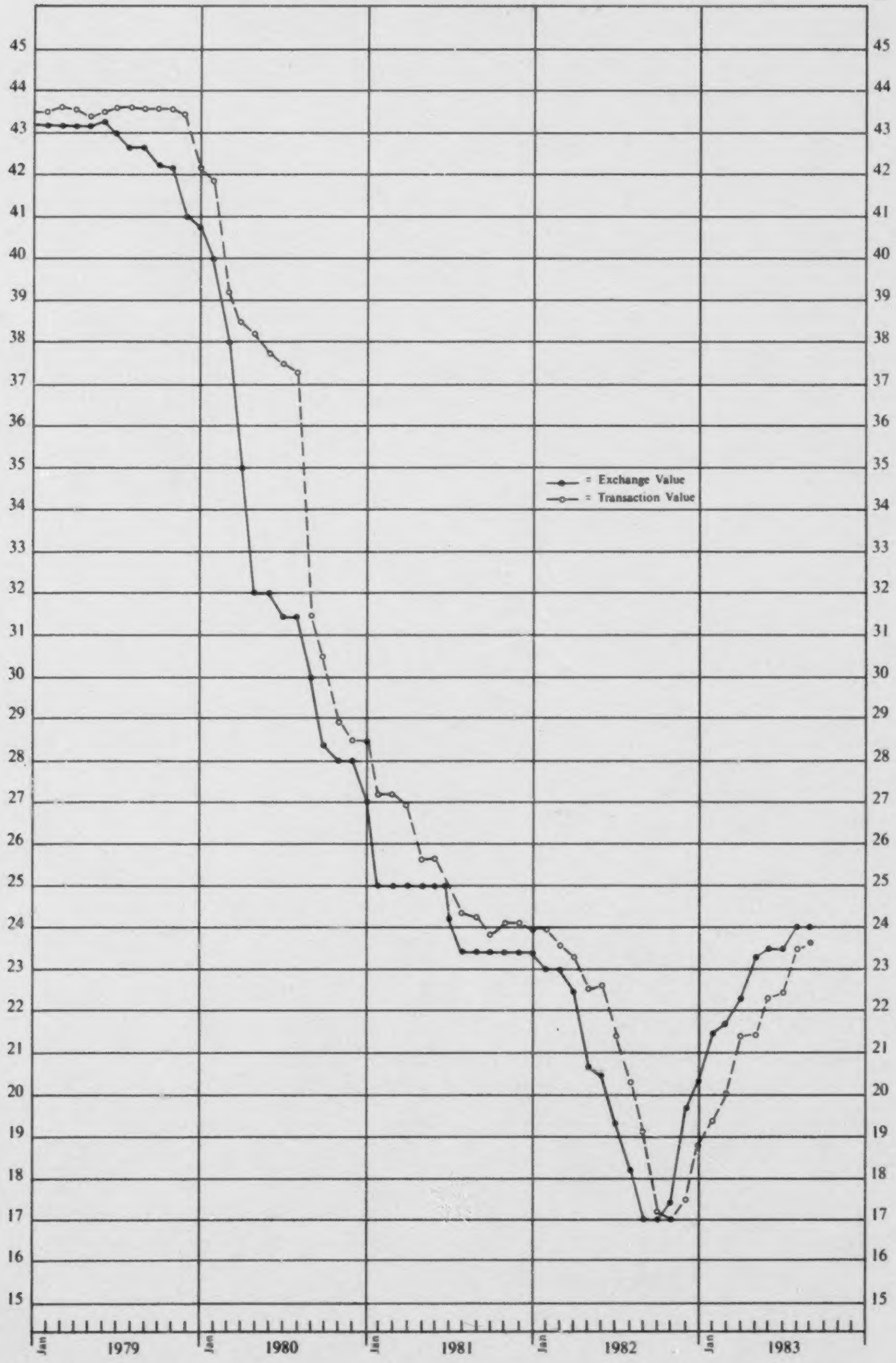
EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1979

Determined as of the last day of the month indicated



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HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	**24.00**				

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	**23.60**				

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	**1.10**				

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AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	**Award Rates of Pay Indexes Australia—Adult Males In Mining Wage Earners, Weekly Rates (Year 1976 = 100.0)[2]**
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.00
Annual Avg. 1981	355.3	237.34
Annual Avg. 1982	368.5R	174.88
Apr 1982	367.7	171.4[2]
May 1982	367.6	171.9
Jun 1982	367.8	173.2
Jul 1982	370.0	177.2
Aug 1982	375.5R	178.2
Sep 1982	375.2R	178.4
Oct 1982	378.4R	178.4
Nov 1982	375.8R	178.5
Dec 1982	375.0R	179.5
Jan 1983	386.9R	179.6R
Feb 1983	388.6R	179.5R
Mar 1983	398.7R	179.4R
Apr 1983	410.2R	179.7R
May 1983	417.1P	179.8P
Jun 1983	—	179.9P

P = Preliminary R = Revised since last month

[1] Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.

[2] Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0), Table 8. Figures are being converted to an Index number. As the data are converted, the new index numbers will be inserted. Figures for the latest fourteen months shown are subject to revision.

[3] Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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GOVERNMENT STATISTICS

CANADA

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[4] [5]				
		Metal Mining, including Milling (SIC 050-099)[3]		Primary Metal Industries, non-ferrous (SIC 296-298)[6]		Chemicals and Chemical Products (SIC 372-379)[7]
			(SIC 296)		(SIC 298)	
Annual Avg. 1979	217.9	9.66	—	7.35	—	7.67
Annual Avg. 1980	247.2	10.80	—	8.05	—	8.50
Annual Avg. 1981	288.7	12.23	—	9.03	—	9.53
Annual Avg. 1982	288.8	13.92	—	9.98	—	10.63
May 1982	288.8	13.86	—	9.88	—	10.62
Jun 1982	289.7	13.83	—	9.92	—	10.69
Jul 1982	290.3	14.02	—	10.05	—	10.73
Aug 1982	290.3	14.23	—	10.03	—	10.80
Sep 1982	292.4	14.01	—	10.18	—	10.73
Oct 1982	292.1	13.89	—	10.18	—	10.86
Nov 1982	291.3	14.28	—	10.43	—	10.90
Dec 1982	292.3	14.32	—	10.55	—	11.06
Jan 1983	293.5	14.35	—	10.72	—	11.06
Feb 1983	293.5R	14.28	—	10.74	—	11.06
Mar 1983	295.2	14.48	—	10.93	—	11.21
Apr 1983	297.1	14.13R	11.57R	—	10.10R	10.97R
May 1983	298.5R	14.14	11.39	—	9.82	11.10P
Jun 1983	299.6R	13.77P	11.26P	—	9.67P	—
Jul 1983	300.8P	—	—	—	—	—

P = Preliminary R = Revised since last month

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[1] Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2] Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3] The wage earner series in Nuexco reports prior to March 1983 was Metals (SIC 050-059).

[4] Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[5] Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

[6] Beginning with the April 1983 figure, Primary Metal Industries, non-ferrous is split into SIC 296 and SIC 298.

[7] Chemical and Chemical Products prior to April 1983 was SIC 370-379. The new series is from a new survey which includes all companies and is based on a 1970 classification. The old survey included companies of 20 employees or more.

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REPUBLIC OF SOUTH AFRICA

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Producer[5] Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[7]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[7]
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3] [6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3] [6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3] [6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Annual Avg. 1981	41.89	206.5	218.3	728,506	2,820,505
Annual Avg. 1982	47.25	233.5	248.7	707,552	3,246,071
Feb 1982	—	220.2	236.8	705,992	250,191
Mar 1982	45.49	225.2	237.4	725,700	262,210
Apr 1982	—	228.9	241.9	707,502	252,562
May 1982	—	230.3	244.8	715,162	258,770
Jun 1982	45.77	232.1	246.7	707,552	261,361
Jul 1982	—	234.1	249.4	702,141	283,248
Aug 1982	—	236.8	253.4	705,562	276,730
Sep 1982	48.04	241.0	255.0	704,344	282,782
Oct 1982	—	243.9	260.1	701,316	285,328
Nov 1982	—	245.4	262.5	707,966	287,699
Dec 1982	49.62	246.2	263.0	683,982	288,019
Jan 1983	—	249.0	264.9	688,030	289,075
Feb 1983	—	253.1	267.4	697,089	281,413
Mar 1983	50.35	255.9	269.1	695,976	290,586
Apr 1983	—	257.8	270.9	697,158	286,708
May 1983	—	259.7	274.1R	701,712	295,701
Jun 1983	50.51	260.8	273.1	—	—
Jul 1983	—	262.5	—	—	—

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[1] Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly. The tonnage-weight index of average working costs per metric ton of gold ore milled for 1983 is as follows. (Base: March quarter 1982 = 100). See Nuexco report #178 page 24 for the tonnage-weighted index for 1982. Description and calculation of the index is on page 16 of Nuexco report #178.

1983:	January-March	111.2
	April-June	111.9

[2] Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."

[3] Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.

[4] April 1970 = 100.00.

[5] Previously known as the WHOLESALE PRICE INDEX, now the PRODUCER PRICE INDEX. The computation remains the same.

[6] Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

[7] Bulletin of Statistics, Department of Statistics, Pretoria.

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GOVERNMENT STATISTICS

UNITED STATES

	Producer Price Index— Industrial Commodities (1967 = 100)[1]	Producer Price Index— All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.75	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	115.08	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	125.79	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	132.34	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	140.05	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
Annual Avg. 1981	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
Annual Avg. 1982	312.3	299.3	289.1	207.15	12.33	12.94	9.96	8.21
Jul 1982	312.8	300.4	292.2	—	12.23	12.94	10.00	8.23
Aug 1982	313.2	300.2	292.8	—	12.29	13.01	10.01	8.30
Sep 1982	312.7	299.3	293.3	208.51	12.53	13.51	10.19	8.37
Oct 1982	314.3	299.8	294.1	—	12.51	13.26	10.22	8.41
Nov 1982	315.0	300.3	293.6	—	12.53	13.22	10.26	8.45
Dec 1982	315.2	300.7	292.4	210.00R	12.53	13.05	10.32	8.51
Jan 1983	313.9	299.9	293.1	—	12.63	13.33	10.34	8.53
Feb 1983	313.9	300.9	293.2	—	12.66	13.29	10.41	8.56
Mar 1983	313.5R	300.6R	293.4	212.83	12.48	13.35	10.39	8.60
Apr 1983	312.6P	300.8P	295.5	—	12.67	13.34	10.43	8.60
May 1983	313.8P	301.7P	297.1	—	12.55R	13.62R	10.50	8.60R
Jun 1983	315.4P	302.5P	298.1	214.66R	12.62P	13.43P	10.51R	8.64P
Jul 1983	316.6P	303.2P	299.3P	—	—	—	10.57P	8.66P

P = Preliminary R = Revised since last month

[1] US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2] US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3] US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table 7.1. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4] US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5] Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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REPRESENTATIVES AND CONSULTANTS

AUSTRALIA

Peter Stork
Oratom Consulting*
5 Gould Ave.
St. Ives
NSW 2075, Australia
Telephone: (61-2) 449-6783
Telex: 73303 (ORATOM AA)

JAPAN

Kazy Yokota
Japan Tech Services*
Ohkura Building (3F)
1-4-10 Shiba Daimon
Minato-ku, Tokyo, Japan
Telephone: (81-3) 431-6031, 431-6025
Telex: 242-5060 (JATECH J)

SOUTH AFRICA

Chris I. Von Christierson
Southern Prospecting (Pty) Limited*
P.O. Box 61409
Marshalltown 2107
Republic of South Africa
Telephone: (27-11) 838-1868
Telex: 8-9878 SA

TAIWAN

Edward Bee
Bee & Liang Company, Limited*
8-G FL Jen AE Mansion
NOK 37 Jen AI Road Sec. 4
P.O. Box 1396
Taipei, Taiwan 106
Telephone: (886-2) 721-2117
TWX: 785-11570 (BEELIANG)

UNITED STATES

Harold C. Lindberg*
83-A Hardee Lane
Whispering Pines, North Carolina 28327
Telephone: (919) 949-3622

Joe L. Hixon*
302 Lombardy
Sugarland, Texas 77478
Telephone: (713) 494-3802

W. Hardy Prentice*
11644 Harborview Drive
Cleveland, Ohio 44102
Telephone: (216) 631-2350

SPECIAL CONSULTANTS

James C.C. Stewart
London

Claus Thiesen
Kirkland, Washington

W. Bryan Webster
San Jose, California

T.C. Wu
Hong Kong

---

*Independent contractors representing Nuexco

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THE NUCLEAR FUEL CYCLE: DESPERATELY IN NEED OF A FRONT-END ALIGNMENT

By

M. J. Reaves
Vice President
Nuexco

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THE NUCLEAR FUEL CYCLE: DESPERATELY IN NEED OF A FRONT-END ALIGNMENT

By: M. J. Reaves
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The front end of the nuclear fuel cycle (about which I'm speaking today) consists of uranium supply, conversion of U_3O_8 to UF_6, enrichment of UF_6 and fuel fabrication. Basically, a commodity and three services. Uranium (the commodity), conversion and enrichment services are all bought and sold as though they were commodities. Thus far fuel fabrication is not resold, although some day it may be.

Our company (Nuexco) is involved in the brokerage of these front end cycle components—uranium, conversion, and enrichment. Our business activities fall into three major categories:

1. We are publishers. We have put out a monthly report on the nuclear fuel industry since 1968. This report comments on supply and demand, recent transactions, and price trends. It includes the Nuexco Exchange Value which is generally viewed as being the spot market price for uranium. We also publish values for the secondary markets for conversion and enrichment.

2. We are consultants. We develop analysis and studies on supply and demand, prices, procurement, marketing and inventory strategies as well as assorted other topics. We work on both a custom and multi-client basis.

3. Finally, and primarily, we are brokers of fuel cycle materials and services. We are the largest nuclear fuel broker in the world, having participated in transactions involving more than 200 million pounds U_3O_8 and millions of Kgs. of conversion and enrichment services.

Nuexco is a worldwide organization. Our headquarters are in Menlo Park, California, and we have offices in Stamford, Connecticut, in Atlanta, Georgia, and in Ferney-Voltaire, France (just outside Geneva). We also retain a complex of representatives and special consultants to provide coverage in all uranium producing and consuming areas, including Australia, Korea, Japan, Taiwan, South Africa, Niger and Gabon. The title of this paper suggests that the front end of the fuel cycle is a mess, and indeed it is. There is a glut of everything, and secondary markets have developed in all three areas.

I'll take them one at a time starting with uranium. All numbers which follow exclude Communist areas.

Uranium

Uranium mines and mills currently in place around the world have the capacity to turn out approximately 150 million pounds U_3O_8 annually. This figure will increase by 12 million pounds with the mid-1983 commissioning of the Key Lake mill in Saskatchewan (really any minute).

Actual world wide uranium production during 1982 was only 106 million pounds, most of which was produced to meet delivery obligations under contracts executed in prior years. Actual uranium consumption during 1982, however, was only 63 million pounds and will not approach 100 million pounds until 1987 or 1988 at the earliest.

So, we have an industry capable of making 150 million pounds, which is actually making 106 million pounds when only 63 million pounds were actually needed. The difference between production and consumption (some 43 million pounds) is being added to inventory, bringing total inventory to more than 400 million pounds, or equivalent to nearly 6 years forward usage. Someone, somewhere is holding that inventory with all the attendant carrying charges. Compare this with 90-day inventories of oil or 120 day coal stockpiles.

Overcapacity and overproduction when combined with numerous cancellations and deferrals of nuclear units have had predictable results. Utilities (the users) became sellers of excess or unneeded inventories, in competition with primary producers. Prices broke, declining from $40 per pound U_3O_8 in early 1980 to a low of $17 by mid-1982 before recovering somewhat to $24.00 today.

While spot prices have strengthened recently, they are still well below the levels necessary to justify new production ventures, and it seems likely that, rather than large new ventures, the first beneficiaries of any sustained price recovery will be production operations that had previously been shut down. But any sustainable price recovery will have to wait for the completion of the liquidation and redistribution of excess inventories.

Conversion

Turning next to UF_6 conversion, we see a somewhat similar situation. There are five major converters in the world: Kerr-McGee and Allied in the United States, Eldorado in Canada, BNFL in England and Comurhex in France. Combined they currently have the annual capacity to convert nearly 120 million pounds of U_3O_8 to UF_6. By 1985, as a consequence of almost completed expansions, this capacity will be in excess of 140 million pounds U_3O_8 annually. However, as noted earlier, the need in 1982 was only for 63 million pounds. The cancellations and deferrals of nuclear plants which led to the liquidation of uranium inventory have also impacted dramatically on the conversion market. Much of the

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excess uranium inventory which is for sale is in the form of UF_6. However, most buyers have already contracted for Conversion and therefore prefer to purchase U_3O_8. A transaction called the deconversion swap was developed. UF_6 is swapped for U_3O_8 plus dollars, with the dollars representing the value of the conversion service. This market is characterized by few buyers and many sellers. Not surprisingly, secondary market conversion prices have been driven down to levels well below prices charged by primary convertors. During the past year, the secondary market conversion price has fluctuated between $1.00 and $1.50 per pound U. This compares to about $3 per pound U available from primary producers.

Enrichment

Finally, there is the enrichment area. Here the principal suppliers number only three: U.S. DOE, the tripartite English-Dutch-German Urenco project and the multinational, French-led Eurodif project. The USSR does sell some SWU into the Western market and development projects in Brazil, South Africa and Japan provide small quantities, but the total quantity from these other sources is not really significant. The principal suppliers have the current capability, at a 0.20 tails assay and 3.0 percent assay, to enrich 130 million pounds U_3O_8. Again, we see supply capability nearly twice current consumption rates. And again we have seen the development of a secondary market to dispose of excess enrichment. Prices are discounted as much as 30 percent from those charged by primary suppliers.

How did this sorry state of affairs that I've described come to pass? It certainly wasn't intentional. Rather it was the result of a complex of economic, political, technical and social factors. Permitting myself perfect hindsight, it is clear that the nuclear option was oversold. Nuclear power is neither as cheap, nor as simple as was promised. Nor was the public reaction to nuclear properly gauged. On the other hand, the nuclear fathers were aware of Murphy's law. They knew nothing is as easy as it looks. They knew that if something could go wrong it would go wrong and at the worst possible time. Reactors are designed that way. But, no reasonable person would have guessed that construction times would treble from 4 to 12 years, and that actual costs would increase by up to 600 percent.

The starting point of this buildup is an unrealistic level of nuclear ordering worldwide in the late 1960s and the early 1970s. At this point, it is important to remember that utilities are unique business organizations. They are regulated monopolies. Their charter is to provide reliable service at the lowest possible rates. When nuclear appeared the cheapest, it was ordered.

As more and more nuclear plants were ordered, the industrial infrastructure responded and commitments were made to enlarge existing facilities and build new ones. It rippled throughout the industry—more uranium development, more conversion capacity, more enrichment capacity, etc. etc. Again, in hindsight, we can observe that the suppliers were uncritical in their acceptance of these utility plans. With scarcely a look backward, they plunged ahead. Serious problems arose including (in no particular order of importance): environmental concerns, the Arab oil embargo, record high interest rates, escalating costs, conservation, economic distress, reduced load growth, and finally, the Three Mile Island incident. Incredibly, however, as these problems began to surface and multiplied and compounded, there was still hardly a look backward; investment continued to pour in and capacity continued to grow, even as the market for these products and services was shrinking rapidly.

Returning for a moment to the utilities, risk aversion translates into conservatism. As nuclear plants were ordered, the utilities became concerned about adequate supplies of fuel and services needed to run these plants. So they contracted for uranium, conversion and enrichment in quantities and on schedules to meet the most optimistic outcome. Too much, too soon might not be desirable, but, for a utility, too little or too late is entirely unacceptable.

In the best of cases, because some delays are inevitable, this meant taking and paying for materials and services before they were needed. In the worst case, which is cancellation of entire nuclear programs, it meant taking and paying for material and services for which there was no requirement at all. All utilities find themselves involved in a web of interlocking contractual commitments. To illustrate: a utility orders a reactor in 1972 for startup in 1980. You contract with General Electric for fuel fabrication services to meet that schedule. In order to provide enriched uranium to General Electric on a timely basis, you conclude an enrichment contract with U.S. DOE—a very long-term contract—30 years—with prohibitively expensive financial penalties for cancellation or late delivery. In order to meet your enrichment contract schedule, you have to contract for timely delivery of uranium and conversion services. Everything gets locked into place. Then your reactor is delayed until 1986, or worse, canceled altogether. Your uranium supplier who has borrowed millions from his friendly banker in order to develop his mine on the basis of your long-term supply agreement is not apt to release you from your obligation to take and pay.

Thus, secondary markets develop as utilities dump unneeded material and services. The reality of the new market has started to sink in. Producers and their bankers have become more skeptical. U.S. uranium production, which exceeded 43 million pounds U_3O_8 in 1980,

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will likely be less than 16 million pounds in 1983. Various Australian and Canadian projects have been deferred. DOE plans for increased enrichment capacity are being scaled back in size and delayed. The real arbiter is price and price is now performing its classic economic function.

As to the future, I would offer three observations which are based on Nuexco's long experience in the fuel cycle business.

1. Excess capacity and excess inventory ares bad enough, but these inventories have continued to grow as production continues to be greater than consumption.

The development of these excess inventories exert, in turn, enormous financial strain on the inventory holders which, in turn, leads to inventory liquidation. Such liquidation has led to a collapse of uranium spot prices and the development of severely discounted markets for conversion and enrichment services.

One is inescapably led to the conclusion that prices will be weak, and buyers will dominate the market until the inventory redistibution is complete. That point is a year or two off for uranium, and probably longer for conversion and enrichment. The bright spot is we can see the end and it is a year or two away for uranium. Furthermore, it is clear that production rates must and will, in time, be more nearly rationalized with consumption rates. We have seen the beginning of this rationalization. Bold new plans to produce more uranium, more conversion and more SWU, ran head first into the reality that there simply weren't enough buyers. Quite correctly more of these plans have been canceled or deferred.

2. Secondly, I would offer the opinion that the nuclear fuel market will be characterized by an unending series of boom-bust cycles. My reasoning is based on the fundamental nature of the utility charter; which, as noted earlier, is reliable service at the lowest possible rates consistent with a regulated rate of return sufficient to attract investment capital. If only five words could be used to describe utility business philosophy, I would choose the words "conscious policy of risks aversion."

This is not intended to be critical of utilities, but merely a statement of the way things are and must be. I personally prefer cheap electricity. However, I prefer expensive electricity to no electricity at all.

As also noted earlier, too much, too soon may not be desirable, but it is preferable to too little or too late. Too much, too soon dictates excess productive capacity, be it in uranium, conversion or enrichment. Excess capacity and inventory build-up lead to price weakness. Price weakness is followed by a dimunition of new capital investment, then later by utility concerns of future shortages, then later by high prices and so on.

3. A third conclusion relates to the inter-nationalization of the market. U.S. uranium is flowing to Europe, Taiwan, Korea and Japan. Canada, South Africa, Australia, Namibia and Niger also ship to customers around the world. U.S. utilities contract for conversion in Canada and Europe as well as the U.S. Europeans, Japanese, Taiwanese, Koreans and others buy conversion in the U.S., France, Canada, and the United Kingdom. The development of the secondary conversion market has added to this mix.

In the enrichment area, the monopolistic position of DOE is a thing of the past. Eurodif and Urenco have captured significant market share. The assignment and sale of SWU in the secondary market have become an enormous business crossing international boundaries with ease.

It is truly a world market. Embargoes and cartels, government sponsored or otherwise, designed to regulate commerce are doomed to fail, as are legislative attempts made in the name of non-proliferation. The efforts of the U.S. government in this area are the clearest demonstration of just how counter-productive such efforts can be. The dominant U.S. enrichment position has been lost; the U.S. is no longer viewed as a credible enrichment supplier and South Africa, Brazil and others are moving as rapidly as possible to create their own enrichment capacity. That's not what I would call a very effective non-proliferation policy.

In closing I would observe that the previous comments suggest a very complex market in which the financial stakes are enormous. Four hundred million pounds of excess U_3O_8 at $25 per pound represent a capital investment of $10 billion. At 15 percent, the carrying cost alone is $1.5 billion annually. If conversion and SWU are added, we are talking of waste, in our relatively small industry, of more than $3.0 billion annually.

Consider a European seller of enriched product which is physically located in Europe. Before the transaction is fully concluded, it may involve a Japanese buying SWU through a de-enrichment swap, followed by a U.S. utility purchasing the conversion component via a location and de-conversion swap, followed by Canadian producer purchasing the U_3O_8, after a nationality swap, for delivery at U.S. converter to a European buyer. This is not a flight of fancy. Such transactions do occur.

These are complicated deals, requiring technical skills, commercial savy, regulatory knowledge, timing and a fair measure of good luck. The market is not likely to settle down. Rather it is likely to be more volatile and increasingly complex.

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OCTOBER 1983 NUMBER 182

Monthly Report on the Nuclear Fuel Market

NUEXCO

HEADQUARTERS

Building 3, Suite 290
3000 Sand Hill Road
Menlo Park, California 94025
Telephone: (415) 854-1510
Telecopy: (415) 854-2115
Telex: 470674 (NUEXCO UI)
TWX: 910-373-1760 (NUEXCO MNPK)

J. Robert Wolcott
Chairman

George White, Jr.
President

Wayne D. Fowler
Senior Vice President

Mathias M. Klingler
Chief Financial Officer

Richard K. Andersen, V.P.

Thomas A. Boyden, V.P.

R. Wesley Miller, V.P.

Christian C. Guitton

Kim M. Peyton

Donald W. Radcliffe

Judith L. Sellers

EUROPE

13 chemin du Levant
01210 Ferney-Voltaire
France
Telephone: (33-50) 428035
Telecopy: (33-50) 428526
Telex: 385288 (NUEXCO F)

James E. Vaughan
Senior Vice President

Kathryn K. Bowen

W. Scott Hickman

NORTHEAST UNITED STATES

100 Prospect Street
Century Plaza South
Stamford, Connecticut 06901
Telephone: (203) 323-1999
Telecopy: (203) 325-1483
Telex: 4750124 (NUEXCO C)

Kenneth R. McCue, V.P.

Robert J. Alexander

Earl E. Hoellen, Jr.

Teresa Elms Lindsay

SOUTHEAST UNITED STATES

Suite 500
Seven Piedmont Center
Atlanta, Georgia 30305
Telephone: (404) 262-7375
Telecopy: (404) 233-6210
Telex: 4611142 (NUEX ATL)

M. Jerry Reaves, V.P.

James H. Allen

(See inside back cover for list of Representatives and Consultants)

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET

October 1983 No. 182

R. WESLEY MILLER, *EDITOR* JAMES J. LIGHTNER, *ASSISTANT EDITOR*

PRICING

Natural Uranium 1
Secondary Market Conversion Services 1
Secondary Market Enrichment Services 2
Interim Sales Contract: Effect on the Secondary SWU Market 2

CURRENT MARKET DATA

Exchange Value and Transaction Value 5
Loan Use Charge Rate and Conversion Value 6
SWU Value 7
Prices Expressed in Selected Currencies 8
Recent Transactions 10
Supply and Demand Tables 11

RECENT DEVELOPMENTS

Canada 16
Japan 16
Spain 16
United States 16

COMMENTARY

SWU Policy Issues 18

ANALYSIS AND COMMENTARY

Summary of DOE SWU Contracts 19
Nuexco's Current Uranium Forecasts 23
The US Federal Energy Regulatory Commission 29

RAW MATERIALS

France's Lodeve Deposit 31

HISTORICAL MARKET DATA

Graph of Exchange Value and Transaction Value 36
Historical Exchange Value, Transaction Value and Conversion Value 37

GOVERNMENT STATISTICS

Australia 38
Canada 39
South Africa 40
United States 41

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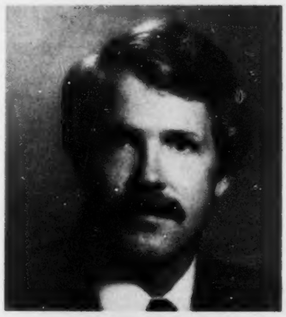
FOREWORD

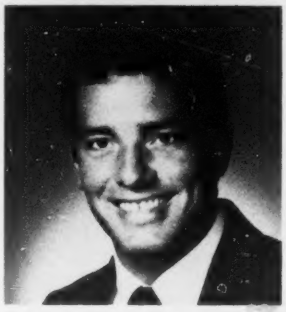
We take great pleasure in announcing the election of Mr. **Oren L. Benton** to Nuexco's Board of Directors. Oren was a long-time associate of Bob Adams and served as Vice Chairman of Energy Fuels before resigning in 1983 to devote full time to his responsibilities as trustee for Mr. Adams' estate and other trust arrangements. Prior to that Oren spent nineteen years with Arthur Andersen & Co., where he was a general partner specializing in tax matters. Oren brings to Nuexco a broad range of experience in finance, accounting, and deal making. His demonstrated ability to structure innovative and complex transactions in entrepreneurial areas will complement and reinforce Nuexco's existing capabilities.

* * *



We are also pleased to announce that Mr. **James H. Allen** has joined Nuexco as Regional Marketing Manager and will be associated with Jerry Reaves in our Atlanta office. Jim comes to Nuexco from Nuclear Resources International, where he was the director of Technical Analysis and a consultant on the enrichment market. Prior to that he was a Senior Engineering Analyst for Nuclear Assurance Corporation. Jim holds an MBA from Georgia State University and an MS in Nuclear Engineering from North Carolina State.

* * *



Another recent addition to Nuexco's staff is Mr. **James J. Lightner**, who is assisting Wes Miller with the production of the Monthly Report. Jim is a recent honors graduate of Stanford University.

* * *

Nuexco will have a hospitality suite during the Atomic Industrial Forum's annual conference in San Francisco, October 30-November 2. The suite will be located in the St. Francis Hotel. We look forward to seeing you there.

NATURAL URANIUM

The **Exchange Value** as of September 30, 1983 is **$24.00** per pound U_3O_8, unchanged from last month. The *Current Market Data* section of this Report lists two uranium sales transactions, involving approximately 260 thousand pounds U_3O_8, *equivalent*. One transaction involved U_3O_8 and one involved natural UF_6.

Active spot and near-term uranium supply (U_3O_8 or natural UF_6 offered at competitive prices, terms, and other conditions) totals **7.2 million** pounds U_3O_8 equivalent, up 500 thousand pounds from last month. **Active spot and near-term uranium demand** rose 83 percent, to **4.4 million** pounds U_3O_8 equivalent. Therefore, the spot and near-term **supply-demand ratio** fell to **1.7:1.**

The **Transaction Value** as of September 30, 1983, is **$23.65** per pound U_3O_8, *equivalent*, an increase of $0.05 since last month. The current Transaction Value includes 21 transactions involving a total of 2.0 million pounds equivalent U_3O_8 and covers a period of six months.

The **Loan Use Charge Rate** as of September 30, 1983 is **6 percent** per annum. The entry of some new supply to the market in September is causing slight downward pressure on the loan rate, but no uranium loan transactions are reported.

* * *

The Exchange Value remained at $24.00 as of September 30, 1983, despite active uranium demand almost doubling. While several sellers have available large amounts of uranium, they appear unwilling to make offers much below the $24.00 level. However, at a time of somewhat increased demand the lack of buyer solicitations to purchase at current prices has also made sellers hesitant to raise offers above the $24.00 level.

SECONDARY MARKET CONVERSION SERVICES

The **Conversion Value** declined $0.10 this month to **$1.00** per pound U as UF_6. Requests for secondary market conversion offers have prompted a flurry of seller activity, suggesting the continuation of a buyers' market.

One secondary market conversion transaction is reported this month. One US utility sold 101-300 thousand pounds U of conversion services to another US utility for delivery in 1984 at approximately 102 percent of this month's Conversion Value. **Active supply** of secondary market conversion services (inquiries to sell at competitive prices, terms and conditions) for delivery within the next three years declined to **5.4 million pounds U**, while active demand for the same period amounts to **1.8 million pounds U**, approximately one third the level of active supply.

* * *

Last month Report 181 listed a single conversion transaction. Although it involved only 50 to 100 thousand pounds U, that transaction had important implications for the secondary market. The price paid was approximately twice the secondary market conversion price then current in the USA. Both the buyer and the seller were European, and delivery was made by an exchange of U_3O_8 for UF_6 (deconversion swap) at a European converter.

Several US sellers actively pursued the European business with offers near the then prevailing Nuexco Conversion Value, but the business was awarded to the European seller. The costs associated with transporting yellowcake to the USA, shipping UF_6 to Europe, and returning empty cylinders to the USA (altogether approximately $2.00 per KgU), when added to the buyer's assessment of the price for conversion at Allied or Kerr-McGee, made the higher-priced European delivery more attractive. The most price-competitive offer still came from a US seller, even after allowing for transportation costs. However, the net price margin was small and, in the buyer's judgment, insufficient to justify the additional effort and perceived risk associated with the transportation problem.

The transaction signals a new development in the secondary market for conversion, as transportation has not been a significant factor in the past. In a typical secondary market transaction the seller's UF_6 is already located where the buyer desires delivery, or the seller can arrange to have UF_6 delivered where the buyer wants it at no additional cost. If these conditions are absent, the buyer must assume the cost of transportation or pay a premium for delivery as desired.

Nuexco's definition of Conversion Value has been clarified this month with a comment noting that the value does not take account of any transportation costs above those customarily borne by the primary converter. Had the conversion transaction reported last month (Transaction number 2449) been reported exclusive of unusual transportation charges, the price would have been shown as approximately 130 percent of last month's Conversion Value, rather than the 216 percent derived from the nominal price. Even after adjusting for transportation cost, the buyer still was willing to pay a substantial premium to avoid the transportation problem.

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SECONDARY MARKET ENRICHMENT SERVICES

The **SWU Value** for FY84 is **$90.00** per SWU as of September 30, 1983, down $5.00 since last month. The *Current Market Data* section of this report lists three SWU transactions, involving a total of approximately 200 thousand SWUs, all of DOE origin. In the near-term secondary market **active supply** totals **1.7 million SWUs** and **active demand** totals **1.4 million SWUs.** However, demand is virtually all discretionary and sellers are competing aggressively for each opportunity. The market is being led by sellers holding large quantities of Eurodif-origin SWUs.

INTERIM SALES CONTRACT: EFFECT ON THE SECONDARY SWU MARKET

As mentioned last month in Report 181, DOE's issuance of the Interim Sales Contract (ISC) has lowered drastically the prices which sellers must offer to induce 3.5-year requirements contract holders to terminate and buy replacement SWUs on the secondary market. The ISC could have caused secondary SWU market activities to come to a halt if it had been accepted widely by active buyers or if secondary market supply had diminished. However, sellers of large quantities of Eurodif SWUs, having no reactors in which to use their excess commitments, promptly lowered their offering prices in order to remain competitive.

As a result of sellers' lower offering prices, the demand for secondary market enrichment services for FY84 and FY85 delivery has returned to pre-ISC levels. Those 3.5-year requirements contract holders that signed the ISC, thereby withdrawing from the market, were in most cases not secondary market participants in the first place. The few formerly active secondary market buyers that have withdrawn had previously expressed strong interest in buying only DOE-origin SWUs. Thus, their withdrawal comes at the expense of those sellers of AFC SWUs (DOE-origin) that had been unwilling to offer the lower prices necessary to compete with the Eurodif suppliers.

DOE 3.5-year requirement contracts cover 43 US reactors, 16 European reactors, and 8 Japanese reactors. A number of 3.5-year contracts had been partially terminated before the issuance of the ISC. Approximately 2 million SWUs for FY84 and 85 delivery had been terminated by US utilities, and 2.6 million SWUs for FY84 and 85 had been terminated by European utilites. Table 1 shows Nuexco's tabulation of estimated SWU requirements for those units still covered by the 3.5-year contracts at the time of issuance of the ISC.

Table 1

TOTAL SECONDARY MARKET POTENTIAL AT TIME OF ISSUANCE OF ISC (thousands of SWUs)

	FY84	FY85
USA	2,240	1,330
Europe	150	120
Japan	540	550
TOTAL	2,930	2,000

The requirements summarized in Table 1 represent total potential secondary market demand from the 3.5-year requirements contract holders at the time of issuance of the ISC. Actual secondary market demand was less. A number of potential buyers have political or other institutional reasons not to terminate and buy replacement secondary market SWU, particularly of non-DOE origin. Table 2 and Table 3 show Nuexco's estimate of the secondary market potential of US and non-US buyers respectively at the time DOE issued the ISC.

As of October 1, 1983, three US utilities representing demand for 880 thousand SWUs for FY84 delivery and 260 thousand SWUs for FY85 delivery have either signed or are in the process of signing the ISC. Likewise, the Japanese customers of DOE holding 3.5-year requirements contracts, representing 540 thousand SWUs for FY84 and 550 thousand SWUs for FY85, reportedly intend to sign the ISC. No European utility has expressed interest in the ISC. Also, since the original offering of the ISC, one US utility terminated and bought on the secondary market 130 thousand SWUs for FY84. The current status is indicated in Tables 4 and 5.

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Only two US utilities that *previously had been in the market* decided to withdraw and sign the ISC. Their actions removed 130 thousand SWUs of FY84 demand and 210 thousand SWUs of FY85 demand from the secondary market for DOE SWUs. The remaining expected signees of the ISC had rejected previously the idea of terminating and buying replacement SWUs on the secondary market, despite the apparent economic advantages.

Potential buyers are continuing to participate actively in the market, confident that they will still be able to terminate their requirements contract deliveries and buy on the secondary market from sellers of Eurodif-origin SWUs at a substantial economic advantage. Sellers of DOE origin SWUs also have been forced to drop their prices to compete.

Table 2

SECONDARY MARKET POTENTIAL AT TIME OF ISSUANCE OF ISC: US UTILITIES WITH 3½ YEAR CONTRACTS (thousands of SWUs)

Utility	FY84	Origin Sought	FY85	Origin Sought
A	130	DOE only	0	
B	160	DOE or Eurodif	150	DOE or Eurodif
C	770	DOE or Eurodif	560	DOE or Eurodif
D	150	DOE or Eurodif	0	
E	220	DOE	210	DOE
F	360	None specified	50	None specified
G	390	None specified	0	
H	0		160	DOE or Eurodif
I	0		140	DOE or Eurodif
J	60	DOE or Eurodif	60	DOE or Eurodif
TOTAL US	2,240		1,330	

Table 3

SECONDARY MARKET POTENTIAL AT TIME OF ISSUANCE OF ISC: NON-US UTILITIES WITH 3½ YEAR CONTRACTS (thousands of SWUs)

Region	FY84	Origin Sought	FY85	Origin Sought
All Europe	150	DOE or Eurodif	120	DOE or Eurodif
All Japan	540	None	550	None

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